THE FARMERS' REGISTER.

VOL. V. AUGUST 1, 1837. No. 4.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

From the Library of Useful Knowledge—Farmers' Series.

MISCELLANEOUS MANURES—CLAY—SAND—POND, RIVER, AND SEA MUD.

Clay.

Such frequent allusion has been already made to the expediency of mixing together different soils of a marked character, as a means of ameliorating their distinct qualities, that it is unnecessary to repeat that recommendation, whenever it can be carried into effect with moderate expense.—This advantage is in no case more fully evinced than by laying clay upon sand lands, whether they be of the red, rich, or more valuable descriptions, or those of an inferior quality, which usually contain a portion of moor and white sand. On the former, about 50 tons per acre will effect a vast improvement; but, the latter are seldom brought into a fertile state with less than treble that quantity. The most eligible period to apply it, is in the autumn, or early part of the winter, when the land is in grass, and intended to be broken up for a crop of corn; or otherwise at the same period, when intended for fallow. The frost, rain, and drying winds will then cause the lumps of clay, however large, to open, and by repeated slight harrowing, to divide and intimately cover the surface before the land is ploughed—a circumstance of little trouble if attended to at the proper season, though, if not so reduced before the land is ploughed, large pieces of clay will be found to have been preserved from the atmospheric influence, and consequently unbroken and unprofitable many years afterwards. It is more profitable to repeat the operation after an interval of a few years, rather than to lay on an immense quantity at once, as by this means the clay gets more thoroughly incorporated with the sand; and it will be obvious that the first ploughing ought not to be to the full depth, lest the clay be lost. It is, however, scarcely practicable to lay clay, in its natural state, upon sand, both because of the great labor of digging, and afterwards preparing it with the requisite degree of care for mixture. If not rendered so fine as to be perfectly incorporated with the sand, its tendency to sink through light land gradually brings it to the bottom, and renders it afterwards useless, if not injurious, by forming a retentive subsoil.

Sand

Is, however, not exposed to the same objections, for it is dug with less labor, and does not require any further trouble in its preparation. Its application, as an alterative for stiff clay land, is of the greatest advantage; for its intermixture with the soil—which is effected by the various means—has a tendency to lighten the land, and to bring it to that loamy state which is the most favorable to the purposes of vegetation. In this respect, its action is the counterpart to that of marl, as applied to light sandy ground; for, in both cases, it is the interest of the farmer to bring his land into that state which is the most likely to be productive.—Marl, by stiffening it, produces this effect in the one instance; and sand, by loosening it, in the other.

Until about half a century ago, this plan was very little known as an improvement to the soil, when a spirited agriculturist in Cheshire began to use considerable quantities; sometimes mixing it with dung, and sometimes laying it raw on his grass-lands. The success which invariably attended these experiments, at length induced several farmers in his neighborhood to follow his example, and the practice has since been very generally adopted in many of the principal dairy-farms in the middle of the country; deep beds of sand being there frequently met with under the clay, which predominates as the superficial stratum of the soil. The mode of employing it is thus described by a land owner who has employed it extensively with the greatest advantage:—

'When there is a piece of strong clay land in tillage, and the farmer has an opportunity of covering it over with sand, about twice as thick as in a common set of manure, the soil will be pulverized and opened by this means—will give better crops when in tillage, and when laid down will produce a finer herbage, less liable to be parched in dry, or trod down in wet seasons. It is excellent management in the farmer, before he ties up his cattle for the winter, to lay a coat of sand, at least a foot in thickness, where he intends to throw his dung out of the cow-houses. The dung should be repeatedly levelled on the sand, and a second coat of the latter laid on towards the end of February; upon which should be put the remainder of the dung procured before the cattle go to grass. As soon after this time as possible, the compost should be either turned and well mixed where it lies, or filled into the dung-carts, and taken away to some situation near the land on which it is intended to use it. Here it should be laid in a heap of at least two yards in thickness; and after remaining two or three months in this state, it is in excellent condition for putting on the land.'*

This, however, only alludes to its employment as a compost; but, if laid in its natural state, either as a top-dressing upon a meadow of a stiff nature, or slightly ploughed in upon heavy arable land, it will be found to effect a permanent improvement in the soil. It must, in the latter case, however, be laid on in very large quantities; perhaps not less than two to three hundred cart-loads, or cubic yards.† This, of course, cannot be accomplished with prudence, unless the sand lies either

*Holland's Survey of Cheshire, p. 231.

† It has been laid on a large extent of drained moss, in Dumfriesshire, at the rate of a single-horse cart-load, to every square yard of surface, though the land was in such a soft state that the sand could only be carted by horses with wooden clogs or pattens on their hind feet. The expense must, therefore, have been enormous; yet the improvement in the land seems to have reimbursed the proprietor. See Dr. Singer's Survey, p. 309.

under the clay, or in the immediate vicinity of the farm; and even in that case, the expense of cartage, if calculated at its cost in money, would appear too serious to admit of much chance of profitable remuneration. Many circumstances, are, however, continually occuring on every farm to prevent the constant occupation of the teams: on those days they may be invariably employed in the cartage of the sand, without any charge except that of day-laborers to dig; and, if it cannot be immediately spread upon the land, it may be laid upon the headlands of the field to which it is intended to be applied.

Mud.

The *mud from ponds*, when they are cleaned out, has always been an object of attention to farmers, so far as regards its collection; but it must be presumed that its different properties, and consequently the most judicious mode of its application to the land, are either but little understood, or neglected; for some cart it directly upon the ground, and plough it in either for turnips or for corn-crops; others spread it upon old leys; and many lay it out in thin heaps to dry, after which they mix it with lime, chalk, or dung. Upon this it has been remarked by an eminent agriculturist, 'that in reasoning with the farmers upon the cause or principle by which they are guided in those different proceedings, the reply is generally, "that it has been their practice to do so—that it has answered very well—and that they know of no better mode of treating it." From which we are necessarily led to conclude, that upon the same, or nearly the same sort of soil, these different practices cannot be right. It, therefore, becomes necessary to consider what is the usual composition of the sediment in ponds,—then to point out as correctly as we are able, the best way of preparing it for use—the soils to which it should be applied—and the crops which ought to succed such application.' *

Upon this it may be observed, that ponds, being usually placed at the lower part of the fields, receive after every hard rain a part of the soil, as well as of the substances with which they have been manured. If the ponds be large and deep, they may also acquire much decayed vegetable matter, arising from the aquatic plants with which such pools usually abound; and if near to the yards at which cattle are commonly watered, they must likewise receive a portion of their dung: such mud is, therefore, particularly applicable to light soils, both as containing nutritive matter, and adding to the staple and consistency of the land. If, on the contrary, the ponds contain springs, the sediment taken from them will be found unfit for vegetation, for it contains more sand than vegetable matter, and it hardens upon exposure to the sun; it may, however, be useful in killing the rushes and coarse weeds upon low sour meadows, but prejudicial if applied to uplands. It is, therefore, evident that the mud must partake of the nature of the various ingredients of which it is composed; and, therefore, every farmer should take these circumstances into consideration before he applies it to his ground.

The most common time of mudding ponds is during the summer months, when it is usual to let the slime lie near the edge of the pond until the water is drained from it. A spot is then marked, either upon a head-land of the field upon which it is to be laid, or as near to it as possible, of a size to raise a compost with alternate layers of either lime or dung. If dung can be had, the best mode of preparing this manure is to lay a foundation of mud, of about a foot or a foot and a half in depth, of an oblong form, and not more than eight feet in width, upon which the freshest yard dung is laid to about double that depth; then a thin layer of mud; after which, alternate layers of mud and dung, until the heap be raised to about five or six feet in height—keeping the sides and ends square, and coating the whole with mud. It should then be left to ferment; after which, it must be again turned, at least twice, at different periods.

If quick-lime be used, and there remains any moisture in the pond scourings, it will be sufficiently fallen for turning in a few days; but, if the compost be made with farm-yard dung, it may require to remain for six or eight weeks to ferment and decompose, before it is in a proper state for turning. To derive the greatest advantage from composts, it is necessary to mix them thoroughly, which can only be effected by repeated and careful turnings. To form them, in the first instance, with both quick lime and manure is injudicious: the former ought never to be brought into contact with the latter—though manures may be advantageously incorporated with an old compost, in which a little lime has been used.

These composts may be applied at the rate of 16 to 20 cubical yards for strong loams, and upon light loams in a rather smaller proportion. Pond mud is, however, not unfrequently used, in an unprepared state, upon grass-lands; but the accounts given of its effects are so different, and the experiments are so inaccurately stated, that we might mislead our readers were we to detail them. Were attention paid to the properties of the mud, and to the quality of the soil on which it is to be laid —in the manner already alluded to—there can, however, be little doubt that errors in its application might be avoided. It appears the better mode to apply it in the latter end of autumn, or the early part of the winter, and to bush-harrow it well after it has been hardened by the frost.*

River Mud in creeks, or banks, from which it can be collected, answers the same description, and is also extensively employed in some districts in the operation of warping, which will be noticed hereafter.

Sea mud, or *sleech*, has also been used in some places in very large quantities, and has been found of so very enriching a nature, that it was thought worth while to carry it in barges up the river Mersey, to the estates of the late Duke of Bridgewater, at Worsley, in Lancashire.† It abounds at the mouths of many of the friths and rivers which run into the sea: and one gentleman, who has used it for upwards of half a century in Cheshire, asserts that no other manure is equal to it, either for corn or grass. It is there, however, always laid upon grass and ploughed in, without any addition, in the following spring. If the ensuing March be dry, and there has been much frost in the winter, a heavy pair of harrows will prepare it for the

* Malcolm's Comp. of Mod. Husb., vol. ii. p. 116.

*Farey's Survey of Derbyshire, vol. iii. p. 187.
†Sinclair's Code of Agriculture, third edition, p. 242.

plough; otherwise, it must be chopped with spades. The land is then generally sown with oats, followed by barley or potatoes, and the third year by wheat. The fourth year the land is laid down either with oats or barley, clover and grasses, and the crops are said to be very great. It is also found that its effects remain longer on the land than marl; and although that which is over-marled is spoiled for grass, yet that never happens to sea mud.* In many parts of Scotland it has also been found to answer very well for the improvement of moss; upon which, after it has been well drained, the sleech is laid, to the amount of 100 single-horse cart-loads per acre.† To this, however, we must add, that that the repetition of it in large quantities fail of its former effects. In Sussex it has been used to the extent of 1200 to 1300 bushels per acre; but, on those farms where it has been too frequently used, and which are thus said to have been "over-dosed," it is no longer found to be of any service.‡

From the same.

REMARKS ON MANURES IN GENERAL—PUTRESCENT, MINERAL, AND MISCELLANEOUS.

We have devoted a large portion of this publication to the subject of manures, both because, in the present state of agriculture, arable land cannot be made to pay the expenses of cultivation without the most skilful and economical, though unsparing, use of the various kinds, and because it is notorious that a great number of farmers are either ignorant of the most judicious mode of their application, or negligent of the means of their increase and preservation. The latter remark applies more especially to farm-yard manure, which no one can ride over any part of the country without seeing wasted—dung carted out of the yards and thrown up by the side of some lane without any foundation or further care, until, perhaps after having become mouldy and firefanged, it is at length turned over, while the best part of its juices have been allowed to run into the ditches, or to stagnate around the heaps—thus, neither assisting the proper fermentation of the dung, nor mixing the heap at such regular periods as to ensure its being all of one quality. §

We have already stated our opinion so clearly on the subject of fermentation, in our view of putrescent manures, that it may be thought hardly necessary to add any thing to the discussion of the point in dispute; yet, as many farmers have been influenced by the reasoning of chemists, who possess no practical knowledge of agriculture, in favor of the invariable appplication of long dung—though opposed by experience—and as it is extremely important that the question should be set at rest, we request serious attention to the following extracts from an able article which has appeared in the Quarterly Journal of agriculture since the publication of what we had written.*

It was promulgated as the opinion of Sir Humphrey Davy, in 1809, and it has, till lately, obtained the confidence of most chemists, that *'as soon as dung begins to decompose, it throws off its volatile parts, which are the most valuable and most efficient. Dung which has fermented, so as to become a mere soft cohesive mass, has generally lost from one third to one-half of its most useful constituent elements; and that it may exert its full action upon the plant, and lose none of its nutritive powers, it should evidently be applied much sooner, and long before decomposition has arrived at its ultimate result.'* Experience has, nevertheless, acted in direct opposition to this opinion. Manure has been continually applied in 'a soft cohesive mass,' and it has continued to raise large crops; whereas, had it been applied 'long before decomposition had arrived at its ultimate result,' that result would probably have been a loss of crop, manure, and labor.

It is certainly an erroneous assumption to say the first stage of fermentation in dung must necessarily throw off its most valuable parts. Every dunghill of fresh dung throws off a gaseous exhalation a very short time after it is put together; and the quantity thus thrown off is regulated by the state of the atmosphere. But, this exhalation does not consist of the valuable gases; it is a mere evaporation of the water contained in the dung. The same hot haze may be seen flickering over a fallow field in a sunny day in summer. Nobody could with truth assert, that this haze arises from the disengagement of the gases in the dung which had previously been inserted into the soil, when it is clearly nothing more than the evaporaton of the moisture in the soil. To say, therefore, the first stage of decomposition in a dunghill throws off "the most valuable and the most efficient" parts of the dung, is just to say the vapor of water is the most valuable part of dung.

'It is true, were the fermentation continued after all the water in the dung was evaporated, a considerable increase of temperature, would ensue; and when the texture of the fibrous portions of the manure began to decompose, there would be an evolution of valuable gases. Direct experiments

---

*Holland's Survey of Cheshire, App., No. III.

†Singer's Survey of Dumfriesshire, p. 311—Gen. Rep. of Scotland, vol. ii. p. 353.

‡Young's Survey of Sussex, p. 218.

§ On this, however, the following remark has been inserted in the report of the committee of the Doncaster Agricultural Association upon bone manure—'The general mode of managing fold manure is erroneous, both as to the expense incurred and loss from evaporation. To prevent both, upon carrying it out to the field, it should be forked up to a considerable height, and the whole covered with the soil nearest to the heap; a long heap, like a potatoe heap, is therefore best; as it accumulates, taking care always to cover the whole of the day's loading, excepting the end to which the next day's work is to be added. The confinement of the steam, which is always observed upon a fresh-made heap of manure, effectually secures the decomposition of the whole; which will cut out like a jelly, *without the usual process of turning over and over.*'—p. 31.

*No. xxiii. pp. 617 to 624. The discoveries alluded to, relate to a substance which chemists call *Humin*, which is said to exist in all soils, and to be formed of carbon and hydrogen. The *Humic acid* is composed of humin and oxygen, and its properties enable it to combine with lime, potass, ammonia, and many substances found in soils and manures, and render them easy to be dissolved in water, which could not be done in their separate state.

has proved the escape of gases from a heap of dung which has been long fermenting. But, what harm accrues to the dung as a manure from the escape of these gases? None whatever. We are told these gases constitute the food of plants, and if they are permitted to be dissipated by decomposition, the quantity of nourishment in the heap of manure will of course be so much diminished; that, if the bulk of the dung-heap be diminished one-half or one-third by excessive fermentation, the quantity of nourishment to the crops will be diminished in a greater ratio. These cautions have long been whispered in the ears of practical men, but they have listened to the advice with a provoking indifference. Like ducklings when they first take the water, they have continued to disregard every remonstrance of their foster brethren against injurious practices, raising and devouring their food, and enjoying themselves with the greatest complacency in their vocation. It is true, and we must admit it, that some of the gases constitute the food of plants, but it does not follow that plants would receive them as food directly, as they are disengaged from a fermenting and heated mass; nay, it is probable they would rather reject the food that would injure them.—But, as plants are not endowed with locomotive powers, they cannot avoid the food which is directly presented to them; they will, therefore, be obliged to partake of it even in an injurious state, and in thus taking it they die. Accordingly, we invariably find that plants suffer from the contact of fermenting dung; and it is this well-known fact, more than from any other circumstance, which deters farmers from applying dung in an unprepared state. It is sometimes applied to the soil, it is true, in an unprepared state, but long before the crop is brought into contact with it, and after it has undergone fermentation in the soil. Though this application of dung is recommended by men of science, it is performed from the very opposite principle which they recommend. They recommend it because the gases arising, while the dung is fermenting, are absorbed by the soil, and are thence given out for the use of plants; on the other hand, farmers perform it, because the fermentation will have ceased before the crop is inserted into the ground. Which of these is the more rational reason? The practical one, undoubtedly; for it is surely impossible that the slight covering of earth upon the dung can prevent the escape of the elastic gases, however it may retard fermentation.

'Moreover, practice finds that fresh dung is injurious to vegetation, and recent discoveries now inform us that this arises from the acridity of the ammonia, which is always present in unfermented dung. Fermentation drives off the acrid ammonia. Fresh dung is found to injure plants by *burning* them, which is a very appropriate term to describe the action of ammonia. In like manner, stale liquid manure is not so good a top-dressing to grass as fresh, or when it is largely mixed with water; because science now informs us, that ammonia becomes concentrated in stale liquid manure, and is, therefore, in an injurious state for plants; and that it is necessary to mix liquid manures largely with water, in order to dilute the ammonia, and allow the proper action of the humic acid, which exists in a large quantity in them. Again, it is not an uncommon practice to cover a dunghill with earth in hot weather; and this is now explained, not as it hitherto has been—"that the earth absorbs and prevents the escape of the carbonic acid gas"—but that a violent fermentation in the dung is checked by the earth, partly excluding the atmospheric air and rain water, the oxygen in either of which is indispensable to continue the process, it being this oxygen which forms the carbonic acid gas by uniting with the carbon of the dung. The necessity of checking a *violent* fermentation in a dunghill, which contains a large portion of horse-dung, is to prevent it being what is technically called "*fyrefangit*"—a state in which dung is nearly useless.

'We thus see that science now agrees with that practice which has been pursued for years with unexampled success. It is consolatory to practitioners to think that their experience, though unknowingly to them, has guided them to success on really scientific principles. This agreement of experience and science should teach every one that science and experience, and not science alone, ought to be made the tests to try the accuracy of opinions; but, unfortunately for the credit of sciences, the test of accuracy hitherto, in the application of putrescent manures, has not been submitted to practice.'

We now not only beg to impress upon every farmer the absolute necessity of guarding against the waste of any portion of the farm dung but also to take care that nothing in the shape of refuse animal or vegetable substance be suffered to be thrown away by his servants. Let a bed of sand, or any earth except clay, be laid in some spot adjacent to the offices, and upon it let every particle of offal collected from the premises be regularly thrown; to which add the sweepings of the roads and lanes about the house, grass, turf or rubbish, dug out of drains and ditches; every thing, in short, which, by decomposition, can be converted into manure, and all of which may be got together with very little trouble. Let the whole of this be every now and then covered with the earth, between two layers of which a small quantity of quick-lime may be placed, or sprinkled upon any vegetable substance, such as leaves, tough, haulm fern, or any thing which cannot be easily dissolved, and thus formed into a compost. Care, however, must be taken that the vegetative powers of the roots and plants be completely destroyed before the compost is spread upon the land; for, if unskilfully prepared, they will shoot up in the course of the ensuing season, and overrun the land with weeds. Composts thus formed, whatever may be the ingredients which they contain, will ever be found a most valuable species of manure. The whole substance becomes one uniform mass of nutritive matter, which may be either mixed with the soil, or applied as a top-dressing, and, with proper attention, may be got ready for application at any period of the year. There are numberless receipts scattered throughout the writings of various theorists, in which the quantity and the quality of each ingredient in these various mixtures are as accurately stated as if they were the medical prescriptions of physicians; but these are mere quackeries which do not merit the attention of practical men.

Weeds, also, by the sides of fences, should never be permitted to perfect their seeds, but should be invariably cut while in a state of succulence,

and added to the heap; and, if those turned up by the process of horse-hoeing were also raked off, instead of being suffered to wither on the land, or to spring up again with the next shower of rain, it is inconceivable what a large quantity of valuable manure might thus be raised by the occasional employment of children, and of laborers, who may otherwise be idling away their time. It would also contribute in a great degree to that neatness which forms a distinguished feature in careful cultivation, and would insure a habit of attention on the part of servants, and a consequent portion of prosperity which can rarely be enjoyed by a slovenly farmer.

Were the *practice of soiling* more generally attended to, it would also very materially aid the increase of the dung-heap, without which no profit can be gained from arable land. But, a very small portion of the soil under the plough is, in this country, capable of bearing crops, unless it be recruited by putrescent manure about once in four years, or that it be either suffered to lie for a more than usual length of time under the cultivated grasses and fed off with cattle, or supported by the fold. To obtain the requisite quantity of farm-yard manure has, however, baffled the best exertions of many industrous farmers, except in the immediate vicinity of large towns. There, indeed, the object is often obtained through the means of purchased dung, the expense of which has been generally amply repaid by the growth of proportionably increased crops; but any one who is dependent upon the produce of his own farm, without the substance of extraneous manure, for the support of the fertility of the soil, should endeavor to cultivate those crops which are best calcuted to afford a large return of food for the maintenance of cattle. When the land is of such a nature as not to admit the growth of green crops, hay and oil-cake should be resorted to for that purpose.

In other cases, *lime*, *chalk*, *marl*, and various other *mineral substances*, have been resorted to as auxiliaries; but, the effect of some of these tending more to stimulate vegetation than to enrich the wasted powers of the soil, it has frequently happened that ground which at one time had been greatly benefited by their application, has afterwards been injured when repeated under the erroneous notion that its powers might be restored by the same operation. Land, thus forced, has in many cases been so much impoverished as to render it incapable of producing any thing but a poor pasture, and to require a great length of time to pass away before it can be restored to its original condition. It should, indeed, be observed, that the application of fossil manures requires more judgment and consideration than any other; for vegetable and animal manures contain the fertilizing property within themselves, and, however injudiciously applied, cannot fail to impart ultimate benefit to the land, if not the immediate crop; but the power of fossils consists in their action upon the constitution of the soil, and if this be improperly directed, the greatest mischief may ensue.

None of these has, perhaps, produced more injury in some cases, or greater benefit in others, than lime—of which very striking instances may be found in those parts of the country where it is either very abundant or scarce. In the former, it has been not uncommonly laid upon the land without the aid of putrescent manure, until the soil has become worthless; while in the latter, as its scarcity renders it expensive, it has only been moderately used by farmers of judgment and capital, and the effects, after a number of years, are still apparent in the improvement of the soil. While writing this, we have under our eye a farm of 400 acres of strong clay, which has not been limed within the memory of man. The tenant, who is conscious of the advantages which might be derived from the use of lime—as demonstrated in the condition of adjoining land of the same quality—is yet prevented by circumstances from its employment; and thus, not only are his own profits, but the value of the soil to the landlord also, equally reduced.

On the subject of *burnt clay*, we have recently had an opportunity of making some inquiries in the neighborhood of the late General Beatson's farm, in Sussex; and we have learned, that although several practical farmers in that part of the country adopted his plan, yet very few of them have found it to answer their expectations. One of them, who has followed it extensively, confirms us in the opinion which we have already stated, that much depends upon the mode in which the operation of burning is performed; for if the clay be calcined to the consistence of brick, it yields nothing in the shape of that soft ash which is proper for manure; and, if not sufficiently burned, it will return to its original condition. In the former state it may, however, act in some degree as an alterative of the soil; and, in the latter, it will at least afford some nutriment to the crop to which it is actually applied. It, therefore, does not appear, from past experience, that it can ever be made to supersede the use of lime on land which has not been formerly dressed with the latter; but, in such cases, or in parts of the country where lime cannot be procured, it may yet be employed to a certain extent with advantage.

As to *paring and burning*, there can be no doubt that the earth, if combined with fibrous roots and other vegetable matter, will answer the purpose of manure when burned: yet shallow soils are thus frequently more injured by the abstraction of too large a portion of the surface, than improved by the temporary addition of the manure. We have lately seen down-land, which was broken up during the war, and has been now during several years returned to pasture, yet still bears nothing like the sward of a fine sheep-walk on the poorest chalks, and probably will require half a century to bring it back to its former condition. We, therefore, cannot but again caution all farmers and owners of land against bringing such soils under the plough.*

With regard to *gypsum and salt* we have nothing to add, except to repeat our recommendation of experiments on their effects.† Though quite

---

* A treatise has been just published by Professor Rennie, on paring and burning, in which he attributes whatever value it may have to the effects of the fire, considering it 'in the light of an instantaneous fallow.' Were this principle to be relied upon, it would follow that paring and burning might, within a few years afterwards, be advantageously repeated; whereas, experience proves that, with whatever benefit the operation may be attended with in the first instance, a repetition of it is always found to impoverish the soil.—See Quarterly Journal of Agriculture, No. XXV.

† See Chapters xiv and xviii.

aware of the common sentiment—'that gentlemen may use their superfluous cash for this purpose, but farmers have uses enough for their money in the regular routine of their business, and few are so over-burdened with capital as to afford the risk of its diminution by uncertain speculation'—yet we entreat them to reflect, that experiments may be tried with those two articles upon a single acre; that the expense, if unsuccessful, can only occasion the loss of a few shillings; but, if they succeed, may be productive of incalculable advantage.

Neither respecting the various *miscellaneous substances* which we have enumerated, have we any further observation to make upon their respective properties. The fluid or disolved parts of animal matter require some preparatory process to fit them for manure, the great object being to blend them with the soil in a proper state of minute division; for when they have been applied in a rank or unreduced state, bad effects have followed. *Train oil, blubber*, and similar refuse, should therefore, be made into composts with a large body of earth.* *Rape and malt dust*, requiring no mixture, are very commonly laid upon the land as top-dressings—the difference between which and manure ploughed into the ground, is, that the former are applied chiefly with a view to the sole benefit of the immediate crop, without regard to the further improvement of the soil; though there can be no doubt that if the crop be increased, the soil will also feel their good effects. In this manner *soot* is also almost invariaby used; but its fertilizing properties are solely referable to the ammonia contained in it, which is an active stimulant of vegetation. The practice of laying it upon land which has been limed, or of mixing it, as sometimes done, in composts with lime, is therefore injudicious.†

It has long been a disputed question, whether all plants extract the same nutritive juices from the soil, and convert them into the kind of sap adapted to their peculiar qualities, or whether each is nourished by a different substance. It would at first appear improbable that plants differing from each other in form, smell, taste, and properties as food, should be produced by the same matter; yet, when we reflect that different plants deprive each other of nourishment, by extending their roots into the same soil in which various kinds are planted, we cannot but conclude that their first nutriment must be of the same nature, though the sap probably acquires different properties in its progress towards perfection. This, however, is one of the secrets of vegetation with which we are unacquainted; but as we also see that some soils are better adapted than others for the growth of particular kinds of grain and vegetables, and that those crops to which they appear the most favorable yet become deteriorated if repeated, even though regularly dressed with one species of manure, it seems evident that there must be some advantage in the change of manures, as well as in the system of cropping tillage land.* This will be gained by every farmer who has at his command manures of an unusual kind, and who understands their use, for he may then adopt many plans of cropping which are out of the power of others not similarly situated, and vary his rotations according to circumstances of the moment, or to his own convenience.

We have already touched upon the properties of alkaline manures, so far as they have been tested by experience; the solution of the effects of acids upon the soil must be still left to future experiments, for those already made by chemists, in many instances, present different results. Whatever may be the food of plants—whether gases, oils, salts, or acids—the farmer, however, need not puzzle himself about their chemical qualities, for he may either satisfy himself from the experience of others, or by small trials of his own, whether the effects of any particular species produce fertility or not. Farm-yard manure has been justly called 'the farmer's magic wand;' and the oftener that wand is waved, the more will it contribute to his prosperity. He sees that wherever it has been judiciously used, it causes abundant crops, and that wherever it has been withheld, sterility seizes upon the soil; his chief efforts should, therefore, be directed to its increase.

Although the time and manner of applying every description of manures depend so much upon the nature of the soil and season, as well as of the crops to be sown, that no precise rules can be laid down for their employment, yet the following general hints may be found useful.

Summary.

When manures of any kind are to be used as top-dressings for grass, the best season for that purpose is as early as practicable in the month of February, as the vernal showers will then wash them into the soil If for arable land, at the same time as the sowing of the seed, or immediately after; but if for wheat, when vegetation is about to acquire force, in the spring.

If dung be applied to a wheat crop, it should be ploughed in during the course of a summer fallow; if compost, at the last ploughing before the seed furrow; but composts of lime and earth only, may be laid upon the land during any period of the year.

The land should be laid dry; and the manure should be equally and speedily spread over every part of it, in proportion to the nature of the soil; but if ploughed in, though it should be well mixed with the ground, it should not be too deeply buried.

The stronger and the colder soils are, the more manure they require; and, as such land is generally applied to the production of crops which do not speedily attain their full growth, the application of dung which has not been completely decomposed by the putrefactive process may be there admitted; for although the progress of vegetation may not be so rapidly forwarded, yet the manure will at length decay, and afford a more gradual degree of nutriment to the present, and greater support to the land for the production of

* 'Tallow and oils received in a crude state by the roots, may clog the pores of the plant, repel the aqueous fluid, and obstruct the free communication of the leaves with the atmosphere.'—Sir H. Davy's Lect. on Agric. Chem. 4to p. 112.

† Hornby on Lime, p. 26.

* Sir H. Davy, Agric. Chem 4to. p. 273. Doncaster Report on Bone Manure, p. 27. See also the recent 'Theory of Rotation of Crops.' by M. De Candolle.

future crops. On adhesive land, long manure from the farm-yard also acting mechanically, by keeping the soil open, is not so binding as short dung; but on dry, sandy, hot soils, the dung should, on the contrary, be perfectly decomposed, or rotten; and manure of any description should, on such land, be only laid on in moderate quantities at one time. One general observation may be made regarding all dissertations on manure, which is—that as there will be different gradations both of soils and the substance of which manures are composed, we can never speak but in general terms of their application.

The following table will explain how many heaps of manure—each containing an equal quantity of any given amount—are required to dress any field, per acre, at certain regular distances: so that, by calculating the solid contents of the manure in cubical yards, each containing 27 bushels, and dividing it by the number of heaps, the exact quantity to be laid on in each heap may be correctly ascertained:—

No. of heaps, at	5	yds. distance.	193	per acre.
"	5½	"	160	"
"	6	"	134	"
"	6½	"	114	"
"	7	"	98	"
"	7½	"	86	"
"	8	"	75	"

From the Quarterly Journal of Agriculture.

ON THE PAST AND PRESENT STATE OF HORSES.

A comparative view of the form and character of the English racer and saddle horse, during the last and present centuries. Illustrated by eighteen plates of horses. London: Thomas Hookham, 15, Old Bond Street. 1836.

We owe an apology for our apparent neglect of the author of this elegant volume. This explanation will convey it:—We expected a knowing article from the pen of a correspondent conversant in the history of the English racer, but were disappointed till we could no longer delay, when about to conclude our volume.

The main object of his work, the author informs us in the introduction to his handsome volume, is to investigate the results of that structural enlargement of animals which is unnatural, and to point out those properties which may be acquired by certain of them when fully reclaimed, and those which they are likely to lose when in this condition. The investigation becomes of vast importance when the character of our race-horse, and of this country as the nursery of the finest horses in the world, is involved in the question. That such an investigation is required, not only at the hands of our author, but of parliament, we may be convinced from the melancholy fact, that our once noble and matchless race of race-horses, the boast of the country and the envy of the civilized world, is degenerating, and will degenerate still farther, if some immediate and efficient means, such as those pointed out by the author, be not adopted to arrest the progress of the evil; and what constitutes an aggravation of the evil, is, that it originates in the avarice and cupidity of our own countrymen, and in that portion too, who, of all others, in their conduct ought to be actuated by higher and purer motives. Instead, as in years by-gone, of emulating with generous rivalry, and prosecuting with laudable zeal, the running and breeding of race-horses for their own noble qualities, the sole object of the "turf" now-a-days seems to be to win heavy stakes, regardless of the animals which are used as the instruments of avarice. The race of the day is run, and the successful competitor is perhaps never more heard of. This is a serious but not rash accusation; it is completely proved and amply illustrated by our author, by examples which cannot be controverted. A comparison of the racers of the last century with those now in vogue, displays a superior fulness of form, and just that which we might expect to find at a time when the tasks performed demanded a fine union of speed, stoutness, and structural powers. The race-horses of the middle of the last century, such as Sedbury, Old Partner, possessed compact bodies, capacious chests, powerful stifles, fine limbs, and general bearing. The racers of a later date, such as Mambrino, Sweetbrier, Sweet-William, acquired properties even more valuable than their predecessors. To a capacious chest and compactness of body, they united strong loins, well inclined and long shoulder-blades, covered with a great mass of fine muscle, muscular arms, and strong joints. The speed of the later horses were increased whilst the muscles escaped coarseness, and the constitution maintained its vigor. Approaching towards the termination of the last century, the properties indicative of increased speed were evolved in such horses as Sharke, Johnny, and Gimcrack. Their chests were capacious, ribs finely hooped, shoulder-blades had a good inclination and great length, having a mass of muscles on the arms and withers, and the quarters, the placing of the hind feet, large pastern joints, and back sinews, all admirable.—Approaching still nearer to our own times, at the commencement of the present century to the days of Muly Moloch, Selim, and Pericles, we find a form still more favorable to speed, by a decided elongation of the skeleton. In form, however, these horses were superior to those who succeeded, but inferior to those who preceded them. They displayed longer backs, longer and heavier limbs, less muscle, smaller sinews, and sharper withers. They came too late in the period of the turf to perform the tremendous work of their predecessors, who used to run six miles carrying eight stones, and heats of four carrying twelve stones. The tasks had been much diminished ere they appeared to public view. From that period to the present, racers have lost much of their vigor and stoutness, and their structural developement has been entirely promoted for one object—speed. Heavy stakes, and lowering the standard of running from heats to a single run of short distance, have been the consequences of unfortunate changes; whilst the continuance of these conditions has been the cause of perpetuating them. The result has been exceedingly unfavorable to the character of our racers and saddle horses, producing weediness, and disposing them to coarseness. The long back, flat sides, long limbs, weak loins, delicate constitutions, and strong disposition to local and hereditary disease of the modern racer and saddle horse, are inadequate substitutes for the short back, short limbs, capacious chests, full sides, and muscular character of the old racer and hunter. Speed and weakness are no compensation for loss of vigor and stoutness.

But the degeneracy of the race horse is an evil not alone affecting itself—it is permitted greatly to influence the character of our saddle horses. Farmers cannot breed saddle horses without the aid of the racer, and yet over the quality of this animal they have no control. As may be expected, the offspring displays many of the bad characteristics of the parents. Hence, farmers will not largely enter into the breeding of saddle horses; they consider it subordinate to every other business of the farm, because they have no reliance on the excellence of the racers' offspring, and they pay little attention to a matter which produces a precarious return. Besides, they least understand a branch of their profession which requires the greatest science in its management. Need we, therefore, wonder that such hunters as Spankaway and Mr. Mickleshwaite's are not to be obtained for love or money at the present day!

The author's eulogiums on the figure and character of the old racers are fully supported by the well-executed figures which he has given from the portraits of those celebrated animal painters of their day—Seymour, Stubbs and Marshall. They are all apparently good drawings from the originals, and beautifully lithographed. Not to appear hypercritical, we should say the portrait of Protector is out of drawing. When so much of the counter and face are seen at a side view, it is impossible, in perspective, that the hind legs could be so near the lower edge of the plate as is represented. This, of course, is not the error of old Stubbs, whose acute eye could trace so minutely the lineaments of the face of the horse. Interesting as is the consideration of the past and present condition of the race-horse, we have not space to devote to the investigation of the rationale of the subject as treated by our author. We must content ourselves in giving an extract from the author's recapitulation of his own arguments.

"The reader has seen that a change of form in our racers was quickly followed by a corresponding change in the nature of the running; that, when the forms of the animals had ceased to be compact, the distances were shortened, and the weights lightened. It has been shown by what expedients the breeders for the turf have maintained a good quality of muscle in the modern race-horse; the accompanying plates prove, however, that the older horses had more muscle on a specific surface of bone than the modern ones; this fact is farther corroborated by the inability of the modern racer to carry the old weights. It is obvious that the interest taken in the turf by those who breed for it, in no degree depends upon the nature of the tasks performed, or on the merit of the horses as a race. The sole object of every individual, breeding for the turf, is to win races, be the nature of them what it may; each of these breeders, therefore, looks to the present rather than the future. There can be little doubt that the tasks performed by the old race-horses were adjusted to their strength, and that the change in the running was the consequence of diminished power in the breed. It has been said that the modern racers are equal to running the old distances; but the intense distress they exhibit when occasionally made to run a single heat of four miles, with a light weight on their backs, leaves no doubt that their stoutness is diminished. Their inability to carry weight is yet more sensible; it is not only shown by the change in the running, but by the want of muscular power in the greater portion of our saddle horses, which have enough of racing blood to secure good action. While it is admitted that the form of the saddle-horse should be compact and powerful, this class has become so rare as to obtain in the market an extravagant price. It is impossible to suppose, whilst the racer exercises its present influence over the character of our saddle-horses, that these can be powerful and compact, while the former is the reverse.

"If the reader agree with us in concluding, that it is the natural qualities of the racer, such as his form and vigor, which have become defective, and not any acquired property, like that of speed, he has now to determine whether the remedy we propose be the proper one. It rests on this foundation—that, as the properties which have become defective are natural ones, we must recur to the source where those properties are found in perfection. The intelligent reader must perceive that the great size, so much admired by the public, in brood mares has been acquired. If these large mares produce the animals we want, they suit our purpose; if they fail to do this, they must labor under some defect which is not altogether of a material character; some higher property has become defective, which can only be repaired by recurring to more natural animals. These we can always render large, by means of richer food than nature affords; but natural properties can only be renovated by recurring to their source. * * * * We find the symmetry of the skeleton in the enlarged horse best adapted for useful purposes, when it diverges least from that which is natural, from that form which we call compact. Horses which are able to traverse a great distance rapidly and frequently, with a considerable weight on their backs, display this form. This, like stoutness, is an effect, and one which nature only can produce. Large horses can only be reared on very unnatural food; they are less stout than small ones under exertion, take more time to recover from this, and do not carry weight so well; in other words stoutness, and the power of carrying much weight for a long distance at a rapid rate, are not dependent on the comparative weight or surface of the muscles; but on a sufficiency of muscles, united with that distribution of the skeleton, which, while it denotes vigor, is mechanically adapted for fine action, and for carrying weight. The reader has seen how dependent are our saddle horses upon our race-horses, and why no private individual breeding for the 'turf" has recourse to fresh blood. This, to be of permanent service, must be in great amount; in other words, the number of the animals must be great to admit of sufficient choice, and to avoid too close alliances of blood. No individual can long maintain a breed of horses in any thing like perfection, if, after taking some years to form a new race, he is to be sufficiently remunerated by letting out or selling stallions at a high price; the breed becomes ruined by its numbers being too small. A fine race of horses may be formed, but it cannot be long maintained, unless its number be great, and fresh blood often had recourse to. * * * * * The English racer, we cannot doubt, acquired his enlarged structure by rich food, and his unnatural speed under the operation of continued selection for that property. If our ancestors were able to exercise this power over nature, and if

we have the same power, is it not worth our while, now that our horses have become so much deteriorated for useful purposes, to try if we cannot farther carry out the system of those who originated the 'turf,' by making the principle of continued selection applicable to a union of properties, rather than to one property? If the standard be discreetly chosen for testing a race of horses, being such as they can go through without distress, should this standard be afterwards lowered because the power of the racer becomes afterwards diminished? If not, and if experience proves that private individuals do lower the standard by which their horses are tested, rather than put themselves to trouble and expense, incompatible with individual interest, ought we not to endeavor, in this special case, to effect, by means of a *national establishment*, that which experience shows is not likely to be effected by individuals? Nothing, it is clear, can long maintain a fair union of properties in these animals, but a test discreetly chosen and steadily maintained. That selected by our ancestors, and continued down to the middle of the last century, was sufficiently searching—it only required to be fixed. The long time the earlier horses remained on the turf, proves the greatness of their vigor, and the fine condition of their limbs. It is notorious how quickly the limbs of the modern racers give way: a single race, nay a preparation for one, often makes them break down. Had the old standard been steadily maintained by which our early racers were tested, the modern ones would not have been permitted to deteriorate in respect to qualities which, being natural, could be renovated by a recurrence to nature. The modern racer has not lost speed; he is swifter than the earlier horses, but he has no longer that form and those qualities which denote sufficient vigor. If we once ascertain the full extent of vigor belonging to horses of the best race, in an almost natural condition, if in engrafting gradually on such a race the acquired properties we want, we observe narrowly the minutest loss of vigor which may, from time to time, be developed, we shall soon ascertain by a mass of facts, carefully recorded, how much of this animal's natural vigor can be united with the necessary amount of artificial speed or artificial structure. The moment a new race of horses, formed after this manner, has acquired sufficient speed and structure, while maintaining sufficient vigor, our standard for testing this union of natural and acquired properties should be at once erected, and ever afterwards steadily maintained. This, at least, should be the course pursued with the horses bred within the precincts of a national establishment. Here, the animals which did not come up to the standard once fixed upon for testing the race, should be drafted, and if the evil pervaded the whole of the enlarged stock, this should be renovated by a cross with the smaller animals kept in reserve for the purpose. We have been led to suggest a plan for the management of some of our native ponies, by the small number of the animals left now to choose from. If frequent recurrence to horses nearly in a state of nature be beneficial, the quality of them should not be allowed to deteriorate. In keeping a considerable number of well-selected native ponies in a pure state, as respects race, while submitting them to the influence of continued selection, we should place them in the situation of our moor sheep and hardy Scotch cattle, which, though nearly in a state of nature, and living on the poorest pasturage, are yet subjected to a system of continued selection. To these small, but admirable animals, we are compelled to recur, when our more factitious sheep and cattle have become too delicate. Under the plan now proposed, none of our native ponies would be enlarged, or withdrawn from their miserable pasturage, unless their form and action were good—the only change then effected would be a pasturage a little better. Any further enlargement would be made to depend upon the manner in which they had been found to bear the preceding one. This plan, though simple and cheap, would, after a few years, be followed by consequences highly beneficial; we should derive from it practical information which cannot be procured by any system less comprehensive; and, if nature be the source to recur to, when the natural propensities of factitious horses are deteriorated, those who breed our saddle horses would find that done for them, which we have reason to conclude they will never do for themselves. The reader is called on practically to determine whether our race-horses are deteriorated in respect to useful and national objects; and, if so, whether the properties, which have become defective, are natural or artificial ones. If he conclude that their natural properties are deteriorated, he will probably admit that nature is the only source to recur to for a remedy."

Our author instances the practice of the breeders of Herefords and Devons, who have continued so long to produce large oxen from small cows with little loss of either hardness or activity; and condemns the theory of Mr. Cline, who maintained the necessity of breeding from large cows. Mr. Cline's theory is not founded on fact; for ordinary-sized cows of every breed, meaning ordinary to be relative to the natural size of the breed, produce the finest stock; and large bulls are not requisite for producing fine stock, provided they are of fine quality. But, it should be borne in mind that Mr. Cline lived at a period when it was generally believed by breeders that the female had the greatest share in imprinting properties on the offspring, and of course he naturally wished to support the prevailing opinion by theory; whereas, it is now universally admitted that the male exercises the greatest influence on the offspring. It should also be remembered that castration has a considerable influence in enlarging the structure of animals, so that whatever may be the size of the parents, the emasculated progeny will always be larger on the same kind of food. In his remarks on breeding cattle, our author inscribes two paragraphs which we cannot reconcile. At page 10, he says, "*the richest pasturage in England, on which cattle are reared, lies on our north-eastern coast.* Here the old short-horns, so many of which came annually to supply London with milk, were bred. They were large, long, and coarse in the limbs, delicate and ill-shapen, requiring at all times expensive food, and fattening slowly; they gave a large quantity of milk, but this yielded little of either curd or butter. This race has been renovated within a few years by a cross with a hardier breed—with one in a more natural condition, and the produce is known by the name of the '*new short-horns.*' This race is a great improvement upon the old one, and *has spread itself through nearly all our*

dairy counties;" whilst, at page 16, he says, "*with one exception*, every breed of grazing cattle in the three kingdoms is reared on either bad or indifferent pasturage. The Durhams are the only grazers we possess which are *reared on rich pasture.* This is a new variety inferior to the Herefords, though more costly to rear. It is handsome, and, when supplied with rich food, the animals become very fat. *This race is confined to a small portion of the kingdom, and there is no prospect of its extending further.*" We have *italicised* the words in the two sentences just quoted, which to us appear contradictory. What are the Durhams but new short-horns? Did not Mr. Charles Collings originate the new short-horns, and did he not originate them in the county of Durham?

Our author devotes three chapters to the mounting and arming of our cavalry, and military punishments. These are subjects foreign to us, yet, having been a cavalry officer, as he himself informs us, our author's opinions on them are entitled to consideration. Indeed, this is the portion of the work which he has evidently written *con amore.* It is entirely free from that quaintness which obscures, and sententiousness which disjoins, the sentiments of the former part of the treatise on the horse. His sentiments on military punishments are expressions of the most rationally humane feelings.

We cannot resist copying extracts from a highly interesting private letter of that accomplished traveller, Burckhardt, to Mr. Sewell, of the Veterinary College, London, which is given in an appendix by our author. It will correct many popular notions respecting the numbers and character of the Arabian horse. Here it is, and with it here an end of the article:

"It is a mistaken belief that Arabia is very rich in horses. The breed of horses in that country is limited to the extent of its fertile pasturing districts, and it is in these parts only that breed prospers, while the Bedouins, who are in possession of poor ground, seldom do possess any horses. We, therefore, see that the tribes richest in horses are those who dwell comparatively in the fertile plain of Mesopotamia, on the borders of the Euphrates, and in the Syrian deserts. It is there that the horses can feed for several spring months upon the green grass and herbs of the valleys and plains, produced by the rains, which seem to be an absolute requisite for its reaching to its full vigor and growth. Horses are much less numerous in Redjed, than in the aforementioned parts, and become scarce the more we proceed to the south. In the Kedjat, in the mountain of that country, and from thence towards Yemen, few horses are seen, and those few are imported from the north. The Atenne tribes of the frontiers of Syria have from eight to ten thousand horses; and half that number belongs to other small tribes roving about in the same province. The single tribe of Arabs, Montefek, in the desert watered by the Euphrates, between Bagdat and Bassora, has, at a moderate calculation, eight thousand horses; the tribes of Dhefye and Beni Thamer, in those quarters, are rich in horses in proportion; while the aggregate number of horses of Redjed, Diebel, Hamac, and Rasyne, viz: from near the Persian Gulf, as far as Medina, is at most ten thousand. The large tribes on the Red Sea, between Akaba and Mekka, and south and south-east of Mekka as far as Yemen, have very few horses, especially those of the mountains. In the eastern plains, beyond Beeche and Redjan, more horses are met with. The tribe of Rantan, who live in that quarter, is celebrated for its studs, and so are the Dowasen. The inhabitants of Redjan and Yemen themselves are seldom in the habit of keeping any; and I believe, not from truth to err, in admitting five or six thousand, are the farthest number in the country, from Akaba, on the north point of the Red Sea, southwards to the shores of the ocean at Nadrament, comprising the great chain of mountains and the level ground on the west of it towards the sea. The hot climes of Omar are likewise said to be little favorable to the race, and horses are still there scarcer than they are in Yemen. In affirming, therefore, that the aggregate number of horses in Arabia, as bounded by the Euphrates and Syria, amounts to almost fifty thousand, a number much inferior to that found in Europe or any other parts of Asia upon an equal extent of ground, I am confident I have not underrated them.

"The richest country in this part of the east appears to be Mesopotamia: the tribes of Curds and Bedouins, in that quarter, very likely possess more horses than all the Arabian Bedouins together, for the richness of their pastures easily propagates their studs. The best pasturing places of Arabia not only produce the greatest quantity of horses, but likewise the best and most chosen breeds. The finest Koheyls of the Khomh are met with in Medjid, on the Euphrates, and in the Syrian deserts; while in the southern parts of Arabia, and especially Yemen, no good breed of horses exist but those imported from the north. The Bedouins up the Redjan have very few horses, their strength consisting in camel riders and foot soldiers armed with matchlocks only. In the tract between Mekka and Medina, between the mountains and the sea, a distance of at least two hundred and sixty miles, I do not believe that two hundred horses can be found, and the same proportion of numbers is to be remarked all along the Red Sea from Yemba up to Akaba. The united army of all the southern Wahabee chiefs, who attacked Mahomed Ali in 1815, at Byssel, consisting of twenty-five thousand men, had only five hundred horsemen with them, mostly belonging to Redjed and the followers of Faisal, one of Sauvris' sons, who was present in the army. The climate and pasture of Yemen is said to be prejudicial to the health of horses, many of them die there of disease; their breed never thrives, and it degenerates in the first generation. The Imam of Sauræ, and all the governors of Yemen, raise a yearly supply of horses from Nedjid, and those of the sea-coast receive considerable supplies by Sowakin from the Nile countries.

"During the Wahabee government, horses yearly became scarcer among the Arabs. They are sold by their masters to foreign purchasers, who carry them to Yemen, Syria, and Bassora, which latter place supplies India with Arabian horses, because they are afraid to have them seized by Saono or his successors, it being become the custom, upon every slight pretext of disobedience and unlawful conduct, to declare a Bedouin mare forfeited to the public treasury. The possession of her besides, obliges her master to attend continually his chief in war. Many Arabs thus prefer keeping no horse at all. In

the district of Djibel Shamar many encampments were seen of late without a single horse, and it was known that the Arabs Meteyr, between Mednich and Kasym, had reduced their horses within a few years from two thousand to one thousand two hundred. The late sheriff of Mekka kept an excellent stud of horses. The best stallions of Medjed were carried to Mekka for sale, and it was become a fashion among Bedouin women, going a pilgrimage to Mekka, to bring the sheriff the stallions of their husbands as a present, for which they took in return presents of silk, ear-rings, &c.

"As far as my knowledge goes, Syria is the best place to purchase true Arabian blood horses, and no district is more convenient for that purpose than the Nauran, where the horse may be purchased from the first hand, and be chosen in the encampments themselves of the Arabs who fill these plains in spring time. The horses bought up at Bassora for the Indian market are purchased second-handed fron Bedouin dealers, and an Arab will seldom undertake to send a good horse far off to the market with the uncertainty of selling it. True blood horses of the Khomzæ, as I am credibly informed, seldom find therefore their way to Bassora, and most of the horses purchased there for the Indian market are belonging to the Montefek Arabs, who are not careful in maintaining a pure breed. It might perhaps be worth while for the great European powers to keep persons, on purpose, constantly employed in Syria in purchasing horses for them, as the best means to cross and improve their own stud. Damascus would be the best position for such persons to reside in. I fancy that very few true Arabians of the best breeds, and still less any first-rate horses of them, have ever been imported into England, although many Syrian, Barbary, and Egyptian horses, have gone by that name.*

"The Bedouins say that the Egyptian mare, if coupled with a blood Arabian, produced a good breed, much better than the indigenate Syrian mares, whose breed is not worth any thing even if crossed with the Koheyl. The Bedouins of Nedjau are in the habit of purchasing mares from the Egyptian pilgrim caravans, which they cover by good stallions, and which they sell afterwards the fillies to the Arabs of Yemen. In Egypt itself, on the borders of the Nile, no particular breed of horses is distinguished; the best horses in this country are produced in those parts where the best clover grows, which is in Upper Egypt about Tahsa, Armimia, and Tarrivoust, and in Lower Egypt, in the district of Meuzaleh. Extremely few blood horses come to Egypt, which is less to be wondered at, as this eminent quality of bearing fatigue is little wanted in the fertile Nile borders. The Egyptian horse is ugly, of coarse shape, and looking more like a coach horse than a racer; thin legs and knees, short and thick neck, are their greatest defects. The head is sometimes fine, but I never saw fine legs in an Egyptian horse. They are not able to bear any great fatigue, but when fed their action is much more brilliant than that of the Arabian; their impetuosity renders them peculiarly desirable for heavy cavalry, and it is upon this quality of the horse which the celebrity of Egyptian cavalry has ever been founded. In their first onset it is much superior to the Arabian, but where long marches become necessary, and the duties of light horses are required, the Egyptian yields infinitely to the Koheyl. The Lybian Bedouins draw their supply of horses from their own breeds as well as from Egypt. In the interior of the desert and towards Barbary they are said to have conserved the ancient races of Arabian horses, but this is not the case in the vicinity of Egypt, where they distinguish as little any peculiar races as the Egyptians do. * * * * * * * *"

"The Arabs of Naazy and Noteyn, Upper Egypt, in the desert between the Nile and the Red Sea, have continued the breed of the Rhouse among them. As in Arabia, horses are possessed by them in partnership; they divide each horse into twenty-four shares or kerats (according to the division of landed property in Egypt, which is always divided into kerats,) and such a one buys three or four or eight kerets of the mare, and shares in proportion in the benefits arising from the sale of the young breed. So little is known in Egypt, among the soldiers, of the true breed, that when in 1812, Ibrahim Pasha's troops took ten Koheyl horses belonging to Noteyn, the soldiers sold them, among themselves, like common Egyptian horses, while their former owners valued them at least three times that price. For one hundred Spanish dollars a good cavalry horse can, at all times, be got in Egypt; the highest prices paid for an Egyptian horse is three hundred dollars, a Bedouin would never give fifty dollars for the same. The Mamelukes formerly esteemed the Koheyl of the desert, and went to considerable expense in propagating their breed in Egypt. The present masters of this country have not the same passion for fine horses as their predecessors, who had, in many respects, adopted Arab notions, and had made it a fashion among them to acquire a com-

* "I have never met with any geldings in the interior of the desert. It would be erroneous to suppose that the horses of the Rhouse, or noble breed, are all of very perfect and distinguished quality and beauty. Amongst the descendants of Eclipse may be found mere hacks, and thus I have seen many Koheys that have little more than this name to recommend them, although the strength of bearing fatigue seems to be common to all the desert race. The fine horses, however, of the Rhouse are in far greater number than the common horses belonging to the same breed; but amongst these fine horses few only are found that may be called *first-rate horses*, in either bone, beauty, or action; among a whole tribe, five or six only, and in the Syrian desert, there are perhaps not more than two hundred of that description, each of which may be worth in the desert itself from £150 to £200; of these latter very few, if any, have ever found their way to Europe, although it is through them alone that successful attempts could be made to *ennoble* the European race, while the usually imported horses are all of a second or third quality."

* "About the pedigree of Arabian horses, I must here add, that in the interior of the desert the Bedouins never made use of any, as among themselves they as well know the genealogy of their horses as they do that of their masters; but, if they carry their horses to market to any town, as Bassora, Bagdat, Aleppo, Damascus, Medina, Mekka, they then take care to have a pedigree written out, in order to present it to the buyer, and only in that case will a Bedouin be found possessed of his horse's pedigree; while on the other hand, in the interior itself, he would laugh at being asked for his mare's pedigree."

plete knowledge of horses, and to keep their stable upon a most extravagant establishment. *
* * * * *"

"The Bedouins use the horses of the Rhouse exclusively as stallions. The finest horse born of a mare belonging to a race which is not comprised within the Rhouse, would, notwithstanding its beauty and perhaps superior qualities, never be admitted as a breeder. Savud, the Wahabee's chief favorite mare, † which he constantly rode on his expeditions, and whose name, Reraye, was become famous all over Arabia, brought a horse of very superior beauty and excellence; the mother, however, being not of the Rhouse, Savud would never permit his people to use that horse as a stallion, and not knowing what to do with it, as Bedouins, like the Lybians, never ride horses, he sent it as a present to the sheriff. ‡

"The Bedouins generally do not permit their mares to be covered until the completion of the fifth year; poor people who look anxiously forward to the profits to be derived from foaling, often have them covered after the completion of the fourth year. The price paid for the use of a stallion, covering a mare, is one Spanish dollar. The master of the horse has a right to waive the payment of the dollar, and may take his chance to wait until the mare foals; if she throws a filly, he is entitled to a young female lamb of one year of age; if she brings a foal, he takes a similar male camel in payment of the use of his horse. When a horse is born, the Bedouins never let it drop down to the ground, but receive it upon their arms out of the womb of the mother, and keeping it for several hours upon their arms, occupied in washing it, in stretching and strengthening its limbs, and hugging it like a baby. After which they put it down and watch its feeble steps with particular attention, prognosticating from that movement the virtues or defects of their future companions. The people of Medjid feed their horses regularly on dates. At Deyrach, in the country of the Flassæ, dates are mixed with the dried clover *(birseem,)* and given them in food. Barley, however, is the most usual food in all parts of Arabia.

"The wealthy people of Medjid frequently give flesh to their horses, raw as well as boiled, together with all the offals of their table. I knew a man at Hamah, in Syria, who assured me that he had frequently given his horses washed meat before a fatiguing journey, to make them endure the journey with greater facility. The same person related to me, that, being apprehensive of the governor of the town taking a liking to his favorite horse, he fed it for a fortnight, exclusively on roasted pork, which increased its mettle to such a height, that it became absolutely ungovernable, and could be no longer an object of desire to the governor. I have seen vicious horses in Egypt, which were apt to bite, cured of this vice in presenting to them, while in the act of doing so, a leg of mutton just taken off the fire, the pains the horse felt in biting through the hot meat, made it give up that trick after a few repeated lessons. Egyptian horses are much less soft in their tempers than Arabian; * they are often vicious, while the latter almost never are, and require to be constantly tied, while the Arabians freely walk about the encampment like camels.

"Egyptian grooms are famous all over the east for the treatment of horses; so much so that the Pashas and grandees all over Asiatic Turkey make it a rule to have always a couple of them in their service. They curry a horse three or four times a day, and make themselves so busy about it, that it is against law in Egypt to have as many grooms as horses in the stable, every one of the former having the care of one horse. The Wahabee chief, who has no doubt the finest stud of horses in the whole east, never allows his mares to be mounted until they have completed their fourth year. † The common Bedouins frequently ride their own before they have completed the third. The Wahabee chief has prohibited his Arabs the selling of one-third of a mare, as is frequently practised among the northern Arabs, alleging that the custom leads often to unlawful and cheating tricks. He permits the selling of one-half of the mare."

---

* "In Redjed, the Nadaba and Dahma are much esteemed. The breed of the Messena of the Koheyl races serves in Redjed never as a stallion."

† "Savud bought her from a Bedouin of the Arabs Kahtan for $ 1,500."

‡ "A troop of Druves on horseback attacked in the summer of 1815, a party of Bedouins in the Hamrau, and pursued them to their encampment, when they were in their turn assisted by a superior force, and all killed, excepting one, who fled. He was pursued by one of the best mounted Bedouins, but his mare, although fatigued, kept up the run for several hours, but could not be overtaken. Before his pursuer gave up the chase, he cried out to him, promising him safe conduct, to beg to be permitted to kiss his excellent mare upon her front. Upon his refusing, he at last left the close pursuit, and in blessing the generous beast, cried out to the fugitive, 'go and wash the feet of your mare and drink of the water.' This last expression is much used by the Bedouins to show the great love they bear to their mares, and the obligation under which they are to them."

For the Farmers' Register.

ON MANURING.

The subject of manures is of the utmost importance to the agriculturist; for, if no reparation is made to the land, for the draft made by the gathered crops, the soil must be impoverished, and a continuation of the system will end in absolute sterility. Some return must be made for what we take; yet, it is obvious, the mode of manuring must be accommodated to the means of the cultivator. A complicated and expensive system, although applicable to a country where labor is abundant and cheap, and the products of agriculture high priced, would not be suitable to one where labor is dear, and the produce of the soil the reverse. In various parts of Europe, labor can be commanded of the most efficient character and at a very reduced rate. In the United States, for the most part, it is widely different; and, if the cultivator of the soil, here, were to em-

---

* "The Arabs have the prophet's saying continually in their mouths, 'good fortune rests upon our noble horses.' "

† "The tail is never left to grow at full length until the horse or mare has completed the back teeth. The back teeth are counted with the mare up to the fifteenth year."

ploy the processes of fertilizing resorted to, for example, in Flanders and England, he might find his perfect farming leading him speedily to ruin. If, in England, twenty dollars worth of labor is applied to an acre of land, and the produce in wheat amount to forty bushels, the ordinary price of wheat there being two dollars a bushel, there will be sixty dollars left for the farmer, after the expense of cultivation is defrayed. But, in this country, admitting the same amount of labor will produce the same result, the price is at least double that of England, and the price of wheat not more than half. It would require forty dollars worth of labor to produce forty bushels of wheat, which, at a dollar a bushel, (a full average price with us) would just pay the expense of production, and nothing would be left to compensate for time, trouble, risk, and use of capital. It is incumbent then on us to employ, as much as possible, in our ameliorating processes, agents that are cheaper than human hands. Some we must employ, or absolute sterility will deprive our country of the power of sustaining us.

It may be profitable to examine, in this inquiry, by what means nature works in producing her various crops from the soil. No spontaneous cover, as far as we know, leaves the soil poorer than when it began to grow; on the contrary, the earth seems constantly to become richer under its productions. A forest of oaks, chesnuts, &c., would appear the most exhausting of all crops—for a clump of such trees standing in a cleared field, produces almost entire sterility for some distance around it. Every body knows, too, that neither grass or grain flourish well near the margin of a field contiguous to the forest. This is not the effect of shade entirely; for, if a ditch is cut between the crops and the forests, deep enough to penetrate below the roots of the latter, the sterility in a great measure ceases. Yet, the land bearing the forest trees, maintains its fertility, and indeed, is constantly improving in that respect—for there is much reason to believe that the far greater part of mould, which covers the surface of virgin land, is derived from the decay of vegetable matter which grows on it. We know the fruitful soil, which covers many of the recently formed islands of the Pacific ocean, is derived from their vegetable production. And there seems to be a class of plants expressly formed to take root on the rising coral islands, when their surface offers nothing but barren sand, and thus to form the initiative of the soil-making process. "This family of plants (the Pandanea) says Dr. Buckland, seems destined like the cocoanut palm, to be among the first vegetable colonists of new lands just emerging from the ocean; they are found together, almost universally by navigators, on the rising coral islands of tropical seas.

The seed thus stranded upon new formed land, produces a plant which has peculiar provisions for its support on a surface destitute of soil, by long and large aerial roots protruded above the ground, around the lower part of its trunk.—These roots, on reaching the ground, are calculated to prop up the plant, as buttresses surrounding the basis of the stem, so that it can maintain its erect position, and flourish in barren sand on newly elevated reefs, where little soil has yet accumulated." Geology and Mineralogy, p. 378 and 379.

We see a soil not only maintained, but actually in a great degree formed by the forest which grows on its surface, and exacting, annually, much more for its support than any crop produced by human art. The exhaustion, occasioned by oaks or chesnuts, already mentioned, compared with that of corn, wheat, or tobacco, is conclusive. The most incredulous must yield to such testimony. How comes it then, that the fertility of the forest is maintained, while our arable fields become barren? The answer is obvious. In the one case, a return is made to the soil, in the annual fall of leaves, and in the decaying bodies and roots of dead trees. In the other, every thing is taken—nothing returned. Nature pays her debt punctually with interest. Man pays nothing. His doom, however, is the same in the natural, that it would be in the moral world, for such conduct. His resources are ultimately cut off for his laziness and folly.

We should observe, however, that, whilst nature pays punctually, she pays with the utmost economy of means proportioned to the end. All her processes are of that masterly kind. Nothing is wasted—her return to the earth chiefly takes place at the surface; and we will find the largest return we are capable of making in proportion to our labor, at the surface.

The most powerful agents, known to us, for this purpose, are the grasses—the most efficient of which is red clover, particularly when stimulated by gypsum. With no other aids in many cases, two crops may be taken in every four years, and the fertility of the soil nevertheless increased, as the following facts show:

Eighteen years since, part of a sloping hill was cleared on the writer's farm, the remainder, of apparently equal quality, left in wood.

This spring, the surface was opened with a spade through the loam to the clay, in the field and in the wood, and the depths carefully measured.

High on the hill side, on the cleared land, through the loam to the clay, measured - - - - -	17 inches.
Twenty yards within the wood, at the same elevation, the loam measured	10½ "
Nearer the base of the hill, within the cleared ground, the loam measured	24 "
Twenty yards within the wood, at the same elevation, the loam measured	10 "

The average difference, between the cultivated land and the forest, being one hundredper cent. although originally of the same quality.

On another hill, and a much steeper one, cleared some years later, and subjected to the same culture, the depth of loam, near the summit within the cleared ground, was	13 inches.
Within the wood, at the same elevation - - - - - -	10 "

The difference, between the two hills in depth of loam, I attribute in part, to the steepness of the latter, which subjected it to more injury from washing rains, when the culture was less protective in that respect, than it is at present. And the difference between seventeen inches and two feet, the respective depths of the loam on the first hill, at different elevations, was doubtless influenced in some degree by the same cause.—In other instances, the writer has had land cleared,

so poor in its virgin state as to be incapable of yielding crops at all adequate to the labor of cultivating them, which, in a few years, by the aid of clover and plaster, has produced profitable returns. The following example will show the effects of this system upon land of various qualities. In consulting my memoranda, I find, in 1820, a field, of about one hundred acres, was cultivated in corn. A portion consisted of worn highland—some was highland of good quality, and about a sixth part was creek low grounds, naturally very rich, but somewhat fatigued by culture. The crop was four hundred and forty bushels of measured corn. In 1836, the same field was put in corn, (with the exception of about three-fourths of the low grounds, which had been separated for a tobacco lot, and substituted by about fifteen acres of ground, cleared from the woods, high, steep, and by no means naturally fertile.) Both years were favorable to the production of corn—but the first more than the last—the corn crop of this country, having sustained some damage in 1836 from excessive rains. The crop of corn measured last year from the field, was six hundred and seventy barrels, besides what was used for fattening fifty-one hogs, which was not measured, but could scarcely have amounted to less than a barrel to each hog.

Land, capable of bringing good crops of clover, may then be sustained and improved by that grass, with plaster, without any other aid, under the four field system; for no other means have been resorted to, in the instances mentioned, except on a very few spots in the corn field, where the land was reduced below the point of producing clover.

But, we have other sources for manuring from the offal of our crops, farm-pens, stables, &c., and have unfortunately a great deal of land in the country, worn below the clover point, which can be resuscitated only by strong manures, in the production of which, they have little or no agency. The question presents itself, how can we produce the greatest result from our means, limited as they are in many cases, in proportion to the object in view? It must be remembered, that our country has an exceedingly uneven surface, (i. e. the country east of, and near the Blue Ridge,) consisting of hills, many of them high and steep, and subject to great injury from heavy rains, where galls and gullies are easily formed. Our stable and farm-pen manure requires to be carried out too, in the spring, when we are busily employed in preparing for our crops. If the teams can be spared, the ascent of the hills is exceedingly difficult with manure, loaded not only with its own juices, but with a vast amount of water it has received and retained from the atmosphere. Much cannot be carried at a load. If the ground has already been ploughed, the ascent is still more difficult, and it is by no means prudent to leave much of the surface, intended for cultivation, unploughed late in the spring. Under these obstacles the manuring, in most cases, would be suspended, or the manure thrown on some ground more convenient, but less in need of it. The alternative seems to be to adopt a different system as a substitute for manuring in the spring, when we are pressed with the preparation of our corn and tobacco land. I would propose manuring in the winter. The coarse food on which our horned cattle are generally wintered may be collected in the field or fields to be manured; a temporary shelter built there for those animals, and the straw, shucks, corn-stalks, and other things spread for them on the weak spots, most needing assistance, except in very inclement weather, when they should be fed at their shelter. What is left by them of the food strewed over the weak parts of the ground, with their dung, may remain on the surface to decompose; but, what is accumulated about the shelter would, generally, lie in too thick a stratum to be treated in the same manner. That might be hauled to the nearest ground requiring it, and either used as a top-dressing, or ploughed in, as might be deemed most expedient. The labor for this purpose could almost, in every instance, be readily afforded. I would not hesitate to winter my cattle in a field intended to remain in grass, as well as one intended for the plough. If the cattle are removed as soon as the grass begins to grow in March, no injury is done to it.

The manure accumulated about the stables, does not freeze very hard below the surface in winter. That too, should be carried out at all convenient periods of that season of most leisure, to the ground for which it is intended, scattered and ploughed in at the first opportunity. Sound economy would dictate that so powerful a stimulant should be spread far thinner than is customary, and made to go over a much larger surface. By this management, little would be left for removal in the busy time of the spring.

It may be asked whether these processes, as recommended, would not expose the agriculturist to great loss from evaporation? Agricultural chemistry is too imperfect to afford a satisfactory reply to this question. But, the gases formed by the putrefactive process, would unite themselves to the atmosphere, whether they are evolved from the surface, or from manures ploughed in, unless, in the latter case, they should form a chemical combination with substances in the earth and become fixed bodies. It is not known that this happens; and it is pretty certain, that a layer of loose earth, thrown on the manure by the plough, would not be adequate to retain any evolved gas there in a state of confinement. In their passage to the atmosphere only, it is probable they are of no service to the growing crops.

Sir Humphrey Davy filled a retort with hot dung, and introduced its beak in the soil, amongst the roots of some grass in the border of a garden. "In less than a week (he observes) a very distinct effect was produced on the grass upon the spot exposed to the influence of the matter disengaged in fermentation; it grew with much more luxuriance than the grass in any other part of the garden." (Agricultural Chemistry, p. 207). This experiment serves to prove the advantage of burying hot dung in preference to using it in any other way, although the passage of its gaseous matter is a fugitive process. But it cannot, with us, be carried into effect over a considerable surface at any one time. And, although the growing crops may be benefited by the gases given off, it is not shewn that the permanent benefit to the land is greater from hot dung than from that which has fully undergone the putrefactive process. I have had many spots cow-penned.—Some have been ploughed as soon as the cattle have been removed; the surface of others has

been left exposed to the atmosphere, and I have by no means been satisfied that, in abiding fertility, the ploughed spots had any advantage over the unploughed. Permanent fertility should be our great object, and not the largest amount of crops for any one year. Labor, (although chiefly slave labor with us,) is very dear; the largest results with the least expenditure of that, should be the great object of agricultural attainment. This is to be effected by a condition of permanent fertility. There are two rules which should not, I apprehend, be lost sight of any where. They are of the last importance to us of this mountainous country. The first, is to increase and not diminish the fertility of our soil. The second, is to make enough to support our respective establishments.

Between these two boundaries we may advance with safety, and with more or less speed; but, if we pass either, we are lost. Without capital, independent of our farms, it is clear they cannot be long supported, unless their own produce yields the means. And, if the fertility of the soil is diminished, the means cannot long be supplied by the produce.

Vegetable matter, green or dry, being by far the most abundant of our resources, and productive of the greatest results within our power, in the aggregate, should constitute the first object of our attention, and be regarded as our chief means of advancing fertility, as the ordinary food of a healthy soil, (if I may be permitted to use such a phrase.) The more stimulating manures, which have a larger portion of animal matter mixed with them, should be regarded as medicines (at least in a lacerated and worn country) to be applied to diseased spots—such as cannot cover themselves with vegetation, or do it very feebly, by their own effects.

[To be continued.]

ON THE GENERAL WANT OF ECONOMY IN OUR FARMING, AND ESPECIALLY IN FEEDING.

To the Editor of the Farmers' Register.

Charlotte County, Va.

I am pleased to see your efforts for the improvement of poor old Virginia so well sustained by the patrons of the Register; and whilst it is doubted by some whether publications of such a character are indeed beneficial, it may not be amiss, in one who has experienced some of its advantages, to record his testimony in favor of your paper. Is it not to you, sir, a matter of astonishment, if any thing can excite that feeling in times like this, that a fair and candid exhibition of facts, or even the show of sound theory, should produce on the mind of any reflecting man a tendency to err? Is this the natural effect of reason or philosophy? or, does the principle extend itself to all other matters of interest? If so, what advantage has the rational, over the irrational part of creation? Blind chance would be a safe and certain guide, (at least as much so,) to any useful discovery or invention as the most accurate calculations. To my mind there are many *pieces* in your columns richly worth the subscription money for the volume. The importance of a due attention to the subject of manure, its management, &c., as contained in several communications on that subject, can hardly be properly estimated. He who reads such pieces, without receiving great benefit, must be blind, not only to good reason and common sense, but also to his own interest and prosperity. The communications on canalling, draining, &c., are well worth an attentive perusal. Those persons who are owners of large mill ponds, or extensive swamps, might, by an application of the principles there laid down, add, not only to the sum of human happiness by removing perhaps the greatest cause of disease in their immediate neighborhood, but, at the same time, increase the wealth and happiness of those they may leave behind, to the latest generation. Several communications on the effect of plaster of paris on tobacco, are of a highly valuable character; and many other valuable communications might be named, if circumstances required it. A gentleman of my acquaintance remarked to me, not long since, that the communication signed "Lawrence," had been of more value to him than three times his subscription. But, sir, you had as well talk of a Jack without ears, as to persuade some men of some things; and I now beg your indulgence whilst your attention is directed to the following hints, facts, opinions, or whatever you may please to call them.

I do verily believe that many of our good people, by negligence and inattention, waste as much food as is actually necessary to supply the real wants of life. This notion, may perhaps, be considered by some as wild and extravagant; but, certain it is, an immense deal is wasted on our best regulated farms. Go, for instance, to the best managed stable in your neighborhood, ten to one if the truth of the remark does not prove itself on first sight. Go to the farm of one who is called a "right snug fellow," and how is the manure preserved? Is it on a level surface, or, as some would say, a *centre sink?* No, sir, three times out of five you will see the better part, the ***very essence itself***, going in a sluice down the hill, to where it can be of no use whatever. Look what a scene of waste and negligence is presented throughout the yard—gates without latches—fences down—stable doors swinging by one hinge, or propped up with a fence rail—hay, oats and fodder, scattered every where—horses, cows, hogs, perhaps sheep and all, jumbled up together—some with one eye—some with none—some hobbling about on three legs—others scarcely able to get along on four. Now, how can you expect men to get along under such a system as this? Look at the farm pens; why all this waste of tops, straw, shucks, &c.?—the whole pen nearly knee deep in mud and mire, instead of a good, soft, clean bed of leaves. Perhaps, in some more private part of the field, you may see carcasses of old cows dragged out for the purpose of testing the value of *bone* manure. Ask what is the matter, or cause of this, and you are told at once—"***Why, sir, she lost her cud; or, died with hollow horn.***" Shall I invite attention to the hog pen? In truth, sir, very little is to be seen there; here and there you will find a few scattering cobs rolled and rooted about in mud until they are as sleek and hard as the feeder's basket handle. May be, by standing a while, you will see a long, thin, lean-sided something, reeling from right to left, and making his way, with stupid eye and cautious step, to the pen, or, rather, to the next sapling, already rubbed as smooth and sleek as a ramrod. Ask, what is the matter, and you will

find the answer ready made—"*Why, sir, the lice have nearly destroyed my stock of hogs!*" Now, did you ever know a fat cow to "lose her cud," or die with hollow horn, or a thrifty corn-fed hog to reel from lice? Go into the corn-field. What waste! the best spots covered with briers and bushes, or lost in water—many places have no corn at all; but hog tracks without number. Examine, if you please, the stacks of wheat, oats or hay—some wet—some rotten—much wasted on the ground. Ask, what is the matter, and I will venture the answer is—"I told the head-man so and so:" when, if facts could be known, the poor man, after telling "so and so," never *went to see;* and, in all probability, his neighbors cows and horses destroyed the stacks—thus "one man soweth, and another reapeth."

Horses, beyond all doubt, may be kept in good working order, throughout the year, on the usual allowance of oats and hay, with only one half the usual quantity of corn, (ten ears being the number generally given at each feed.) I have only given from four to five ears of corn, at each feed, with the usual quantity of rough food, for years successively; and, indeed, for several months in the year, we give no corn at all. But, no man can keep his horses in good order, for any length of time, without bestowing *personal attention* to the subject, whether he feeds on a full allowance of corn or not. The practice of filling the racks with more hay, or food of any kind, than the horse will consume at one feed, is not only injurious, but wasteful. We are too apt to think, if the rack is full, the horse cannot suffer; and, in this way, we often find a poor horse standing by a full rack. In regard to colts, calves, &c., much food is also wasted. They may be sufficiently well kept on low grounds or meadow land, without the aid of *extra feeding*—that is, when the ground is not covered with ice or snow. The winter of '36, was, as you know, a very hard one. I then wintered six or seven colts and several calves on a piece of meadow land containing fifteen or twenty acres, and that not very well set with grass. My colts, however, became poor—very poor; and I could say with Pharaoh—"Behold, seven other kine came up, poor and very ill-favored, and lean fleshed—such as I never saw in all the land of Egypt for badness." But this, no doubt, was the consequence of my own negligence in not having a suitable shelter to protect them from bad weather. So, sir, you see I am as ready with an excuse for my poor colts, as some are for their poor cows and hogs. My colts and calves, managed in the same way last winter, but sheltered, looked tolerably well—sufficiently so, at least, for the *scrub breed;* and I am well acquainted with a gentleman of much observation, who has pursued this plan successfully for years.

The above remarks are made chiefly to corroborate a statement in regard to the management of work horses, published in the Farmers' Register some time ago, and signed

W.*

NEW METHOD OF PROPAGATING APPLE TREES.

A paragraph under the above interesting caption, has taken its annual trot through our country's papers for quite a number of years—we do not know how many—but it is quite an old acquaintance. Now, if the editors who give it circulation, would try to propagate apple trees in this new way, they would soon be able to prove to their readers all about the new method. For ourselves, we feel perfectly satisfied, and feel willing that our readers should know as much about it as we do ourselves. The method alluded to is to "take shoots from the choicest trees, insert them into a potatoe, and plunge both into the ground, leaving about an inch or two of the shoot above the surface." We have tried this new method, and known it to be tried by others, and the result has been invariably that only one of the combined material grow, viz.—the potatoe. *Yankee Farmer.*

STATEMENT OF THE PRODUCTS OF SUCKERS LEFT TO GROW ON CORN.

To the Editor of the Farmers' Register.

Charlotte, June 20th, 1837.

* * * * * *

Whilst my pen is in hand, and paper before me, I will give you a correct statement about the corn-suckers alluded to in a publication of yours some time last summer in the Register. I counted 106 hills of corn which threw out 139 suckers—92 of them bore good and measurable ears—47 produced no ear, that is, no measurable ear. Some of the hills produced three suckers, and each sucker a good ear—others produced two. Sometimes each would be a good ear—then again there would be no ear at all. I could not discover any injury sustained from the suckers whatever. It occasionally happened, that the main stalk, throwing off two or three suckers, produced of itself two good ears; at the same time the suckers doing their part.

Yours, respectfully,

T. E. Watkins.

[The foregoing is in answer to our inquiry addressed to some of the very few farmers in this region who omit the very troublesome job of keeping their corn suckered—of which the cost is so certain, and the expediency at least very doubtful. Mr. Watkins has practised this plan for several years, and entertains no question but that he profits by letting the suckers alone—and it is very unlikely that he, or other judicious farmers of his county, can be far mistaken in this general opinion. His experiment is very satisfactory so far as it goes. But it would have been much more so, if he had suckered a portion of the field, as usual, and measured and compared its product with adjoining and equal land.]

A MARE'S TWINS OF DIFFERENT RACES.—MARSH LANDS ON THE CHESAPEAKE.

To the Editor of the Farmers' Register.

Poplar Grove, 22d June, 1837.

Dear Sir:

I send you a certified statement of a very curious fact which has happened, this spring, in the neighborhood of Salem, in New Jersey. In the course of my reading in natural history, I do not recollect to have met with a similar one, at least in the quadruped kingdom. I have seen

* See excellent article referred to, at page 590 of vol. iii.—Ed.

a case somewhere recorded of a white woman who had twins, one perfectly white, and the other a mulatto; but in that, as well as the case reported of the trial of Alexander Whistelo, in New York, some years ago, it became a matter of doubt whether the color of the child was in the due course of things, or whether it was a freak of nature, produced by the force of imagination. If you have read the trial of Whistelo, you were at least amused by the brilliant wit of counsellor Sampson, if you were not profitably instructed by the learning of Dr. Mitchill. The truth and accuracy of the statement I inclose you, of a mare having brought twin colts—the one a mule, and the other a horse—I am certain, from the appearance, manner, and character of Mr. Bilderback, as well as the testimony of his neighbors, does not admit of a doubt.

Being on the eve of departure to make a short visit to England, I avail myself of this opportunity of saying to you, that I hope to pick up, whilst there, some fragments which may be useful contributions to your valuable agricultural work; and, intending to visit the fens of Lincolnshire, and the Romney and other marshes, I will endeavor to bring you drawings of the wind mills employed in draining them. It has long been my opinion, that power of this sort is the only mode by which the valuable marshes on some of the water courses of the Chesapeake bay, could be effectually and profitably drained. There are some of the finest alluvial marshes in the world, on one or two of our rivers in the lower part of the peninsula of the Eastern Shore, if they could be laid dry; but, the very small mean difference between the high and the low tides of our bay forbid this, in any other way than by artificial power—all other means having already been unsuccessfully tried. There are also, in the north of England, some cheaply made rail roads, chiefly for the purposes of the farmer, which it will be a part of my business to see and examine.

I took the liberty, some time ago, of requesting you to suspend the publication of a series of essays, on the subject of a rail road through this peninsula, the first number of which you had taken from one of our papers, because of the hasty and inaccurate manner in which they had been printed here, and promised to send you corrected copies, which I never have found time yet to do. Our engineer, Colonel Kearney, has made a report upon this subject, after a survey, which was published by our legislature without maps, and the same report is about to be republished by order of Congress with maps; and, as soon as it is out, I will endeavor to have a copy sent to you, which I will beg you to have republished in your work instead of the essays, as it will now answer a better purpose, and be more acceptable to your readers.

I am, dear sir, very respectfully,
Yours,
THO. EMORY.

Near Salem, N. J., June 6th, 1837.

I hereby certify that I have a mare, which, this spring, produced twin colts—one of which was a mule, and the other a horse colt, both having attained, before parturition, the ordinary size. The mule is still living, and the colt died without getting up, having been strangled by the cawl, or sack, from which the colt was not able to extricate itself. The mule is brown, of the ordinary appearance. The colt was a fine sorrel, with blaze face and white feet. This circumstance is regarded in this neighborhood as one of a very singular character in natural history, and was seen after the death of the colt by several persons, to wit: my son Joseph, and Charles Slade.

The mare ran in my stable yard, to foal, by herself; and it was next to impossible that the colt could have been brought into the yard by any other means than by the mare which foaled the mule. It was known last spring, that soon after the mare was served by the jack, that a two-year-old colt of my son's got to and served the same mare; and, as a further proof that this colt was the fruit of this act of coition, the colt was of the same color, and marked with white in the same manner as the supposed sire.

JONATHAN BILDERBACK.

Teste:
THO. EMORY,
ROB'T. C. JOHNSON.

Salem, June 10th, 1837.

I hereby certify that Jonathan Bilderback is a respectable farmer in my neighborhood, and, that I believe him to be fully entitled to credit as a man of veracity.

ROBT. G. JOHNSON.

From the Mining Journal.

DEEPEST MINE IN GREAT BRITAIN.

Our readers may perhaps recollect that, some time ago, a coal pit said to be the deepest in Great Britain, was sunk at Monkwearmouth, to the depth of 264 fathoms, or 1,584 feet below the surface;* and that, in November, 1834, Professor Phillips of York, along with a number of other scientific persons, descended the pit, and made a series of very interesting observations on the variations of the barometer and thermometer in the course of their descent and ascent. The temperature, by these observations, increased in proportion to the depth, and a thermometer sunk into a hole, drilled to the depth of two and a half feet into the floor of the workings, from which hole the air was carefully excluded, after remaining in that position forty-eight hours, stood at 71.2. Since the date of Professor Phillips's visit, the enterprising owners have sunk it still deeper, and the average temperature has increased to seventy degrees, a degree of heat which makes it difficult for the men to work beyond six hours at a time.† In addition to this inconvenience, a species of fly, about an inch long, has appeared, by the bite of which both men and horses are much annoyed.

From the same.

EXTRAORDINARY SPEED.

On Thursday, the 15th instant, a large and powerful locomotive engine, built by Mr. Timothy Hackworth, of New Shildon, for the Emperor of

* There are more shafts than one at the consolidated mines in Cornwall, which are nearly 300 fathoms in depth, or 1800 feet.

† At the bottom of Wolf's shaft, at the consolidated mines, the temperature is said to have been as high as 96.°

Russia, was shipped on board the *Barbara*, at Middlesbro'. This engine is constructed on an improved principle, and finished in the best manner. She has been tried on the premises, and propelled at the rate of seventy-two miles per hour! It is said that this machine, and the similar one built at Newcastle, will, on their arrival at St. Petersburgh, have cost the Emperor upwards of £2,000 each. Who, a few years ago, would have dreamed of the exportation of machinery from the river Tees? This engine is for traveling on the rail road from St. Petersburgh to Pawlowski, where stands one of the country places of his Imperial Majesty.

For the Farmers' Register.

ITEMS OF ECONOMY, &C.

Long rows.

As all good agriculturists are remarkable for their attention to small things, and as all good general management may be resolved into successful attention to minutiæ, I have determined to give you a chapter of items on economy in small matters, believing that the Virginians, generally, are remiss in their attentions to little matters.

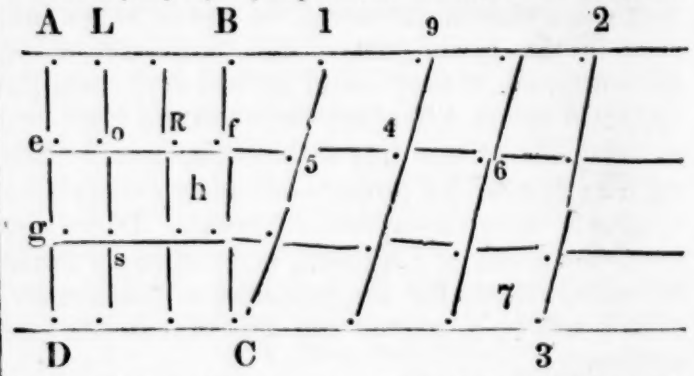
On most of the large rivers in the state, there is a declivity from the bank of the river to the first draining ditch—the river banks being almost uniformly higher than the adjoining flat land. This circumstance has induced many farmers to run their corn or tobacco rows up and down, from the ditch to the bank, and then back to the ditch, for the purpose of effectual drainage. Where the distance is short, from the bank to the draining ditch, this practice is productive of much loss of labor, and other inconveniences. When I came in possession of the plantation on which I now reside, the flat land had been for many years ploughed in the manner above described—from the river bank to the ditch—and I continued to plough it in the same direction the first year. The rows were from seventy-five to one hundred yards long, and about half of the upper part of them were sandy, and the lower part stiff pipe-clay. I found that the ploughmen uniformly consumed more time, by a third, (at least,) in ploughing this field, than any other field of the same extent on the plantation. I ascertained too, that when the sandy part of the flat was in good order to plough, that the lower and stiff part was not. The growth of the corn, cultivated upon it, was so irregular, that when the corn on the sandy part was sufficiently large to *lay by*, (or receive its last ploughing,) that on the stiff clay loam was too small. These observations induced me to plough parallel with the river bank, and run the rows a distance of four hundred yards. When the change in the direction of ploughing was first made, the flat was flushed up in beds of twenty feet width, with a three-horse plough. Very deep water-furrows were thrown out between them, and cross furrows, or grips, were run at the distance of fifty yards from each other, which conveyed all the superfluous water of the flat in the draining ditch. I think the field is better drained than it was before the change in the direction of the ploughing. A great saving in ploughing has been effected, and the stiff parts of the field are in better preparation for the growth of vegetation, than I have ever seen them before.

I have found, from observation, that a horse will walk twenty or thirty yards during the time another is turning; and that the operation of turning is frequently lengthened out, more than is necessary, by a lazy ploughman. In ploughing an acre, then, of the breadth of eighty yards, thirty yards in every eighty would be lost in turning, or more than one-third of the time required in ploughing the acre; while in ploughing rows of four hundred yards in length, only thirty yards, or one-third as much time is lost.

Crossing in the step.

There is a considerable gain, in *distance*, by (what is usually termed,) *crossing in the step*, in hilling for tobacco, or in planting corn. It is a desideratum with the planter, that each tobacco plant should have sufficient room for its own growth, without crowding against its neighbors; which object is much promoted, by making each hill opposite to the *interval* between the two nearest hills in the adjoining row, instead of making them immediately opposite to the *hills* in the adjoining rows. Or, in other words, by making the hills in oblique angled parallelograms, instead of squares.

Let A, B, C, D, represent a section of a tobacco



field, where the rows A B, e f, &c., are straight and parallel, and each hill, e, o, is opposite in right lines to A, L. If the hills are made a foot apart, any hill, (o,) would be equidistant from the four nearest hills, e, L, R, s. But when the hills are made in oblique parallelograms, as in the figure, 1, 2, 3, any hill, (4) would be one foot from the hills 5 and 6, and more than a foot each, from the hills 8 and 9; which may be seen from a bare view of the figure. There are the same number of hills in each of the figures A, B, C, D, and 1, 2, 3, which are parallelograms of equal bases, and between the same parallel lines; and consequently contain equal areas. Any field, however irregular its form, may be hilled in oblique angled parallelograms, as conveniently as in squares, and a real advantage, as regards distance, gained.

The manure prong.

Decidedly one of the greatest labor-saving machines I have ever seen on a farm, is a manure prong, lately introduced into this county, from a northern manufactory. It is formed precisely like a spade, except that in the place of the blade of the spade, there are four prongs, considerably curved upwards, so that the most projecting part of the curve, serves as a fulcrum to loosen the manure, when the instrument is stuck into a manure heap. This instrument is decidedly prefera-

ble to the pronged hoe, which is so highly recommended in Taylor's Arator. It is almost impossible for the farmer, who has not used the manure prong, to form a correct estimate of its value for loading carts and scattering manure. The excellency of this little instrument consists greatly in the manner of its execution. And I imagine, that but a poor substitute could be made for it in the country shops. Their cost, at the retail country stores, is a dollar each, and he that knows their value and refuses, from economical motives, to purchase them, is a farmer who will "starve his trade." A frequent resort to *temporary expedients*, (usually termed *make-shifts*,) is the essence of bad economy. Whatever the planter undertakes to do, should be done in the very best manner—with a view, principally, to utility and permanence, rather than cost and appearance. The implements of his trade should be of the best kind, and should be kept always in the best order. Attention to such things, constitute the great difference between farmers.—An economical farmer will plough his land deep, because deep ploughing will bury the seed of grass and weeds, too deep to vegetate, and he will be but little troubled with grass. He will bush his oats—weed out his corn early—will *take time* to drain his land—will always mend a breach in his fences, or houses, as soon as they are discovered, because attention to such matters, saves labor "in the end."

E.

For the Farmers' Register.

NOTICE OF THE FARM OF J. F. EDMUNDS, OF CHARLOTTE.

In fulfilling my engagement to visit the best managed farms, and report to the readers of the Register such points of management as seem to be most deserving of imitation, I find it a difficult task to determine what models to select. There are many plantations in Charlotte, Prince Edward, Halifax, &c., on which the best management exists, on the old plan of cultivation: that is to say, their management denotes economy, industry, good arrangement, and neat cultivation. Such plantations have been very profitable, in times past, to their owners; but this profit has been derived from the cultivation of tobacco. And it must not be disguised, that most of the estates that have produced large tobacco crops, have greatly deteriorated in value on account of the paramount attention required by this crop, to the neglect of all permanent improvement. I, by no means, intend to assert, that tobacco culture is incompatible with improvement. There are many successful tobacco cultivators who have improved their estates; but the great majority of the thorough-going tobacco cultivators, have adopted the three-shift system—have no standing pastures—raise no hay—sow but little clover—and bestow but little attention on the subject of manures. The planters, who are deriving the most profit from their plantations, are practical men, who have been successful cultivators of tobacco, and who have devoted a part of the labor and resources of their farms to raising manure and the grasses. The sight of such a plantation, a few years ago, in the tobacco region of Virginia, was like an oasis in the desert—as rare as it was refreshing—but their number is annually increasing; and there are now considerable districts of country, in Charlotte and Prince Edward counties, that present a view of good meadows, well manured lots, and large fields well set in clover. But, without indulging further in general remarks, I will proceed to give a short account of the successful management of the planters residing on Wardsfork creek, in the county of Charlotte. The planters in this part of the county at first acquired their celebrity by making high priced tobacco. A few years back, when the tobacco that suited the French market commanded higher prices than any other description of tobacco, almost every planter, without a single exception, known to the writer of these lines, that raised a tobacco crop on Wardsfork, obtained a good price for it. The general character of this tobacco, was not only yellower, but it possessed a finer texture, and contained more oil, than the tobacco grown in other parts of the county. Such general success could scarcely be attributed alone to superior management; and it is now a prevailing opinion, that the Wardsfork lands possess some ingredient very favorable to the growth of tobacco; and as these lands have been supposed by many to contain lime, in some of its combinations, I have but little doubt, that it is the marl ingredient in the Wardsfork soils, that renders them so peculiarly adapted to the growth of both tobacco and clover. There is a recuperative energy in the soil on this little stream, that is rarely met with in other soils. The sub-soil, after a few years exposure to the sun and frosts, when aided by a little manure, is almost as productive as the original surface soil.

As a specimen of the Wardsfork management, I will solicit the readers attention to a hasty outline of the farming operations of John F. Edmunds, esq. In riding up to Mr. E's house, the greater part of his cleared land appears in full view from the road; and nearly the whole of his uncultivated land is seen set in clover or herd's grass. Mr. E. cultivates both corn and tobacco on clover leys; and considers clover to be well adapted to precede a tobacco crop, provided plaster is used on the tobacco as soon as it is weeded out. He thinks that tobacco is a very precarious crop to follow clover, unless plaster is used. There are some features in his management different from his neighbors; and, in fact, different from the management of any planter with whom I am acquainted, in the tobacco section of the state. The oat crop, is almost universally cultivated in this part of the state, and is generally considered one of the few crops peculiarly adapted to our latitude and soil; but Mr. E. does not sow an oat grain on his plantation. He considers oats a very exhausting crop—they require seeding at a very busy time to the tobacco planter, and are taken from the field, at a time of the year, when the land is most exposed to injury from the sun. He uses herds grass hay as a substitute for oats; and always makes enough hay for his teams, and frequently sells a part of the produce of his meadows. Mr. E. sows down the whole of his corn land and tobacco land in wheat. He thinks that the tobacco crop is the very best crop to precede wheat, and contends that it is better than a heavy clover ley. His profits from his wheat crop are much greater than he ever realized from the oat crop. In addition to the flat land already set in herds grass, Mr. E. has lately sown thirty acres of the best of his flat land on Wardsfork. And as his

meadows now yield a sufficiency of hay to supply his plantation, he expects to sell annually the produce of the thirty acres. He thinks our climate is well adapted to the growth of timothy and herds grass; and he has raised crops of hay as large, per acre, as the highest reported account of the produce, per acre, of any northern farm. The planters on Wardsfork, generally, have paid great attention to meadows. They have been very successful in reclaiming flat lands, that lie too low for constant cultivation, and putting them down in grass to mow. And there is a peculiarity about their mode of preparation of a scene for meadow, that is worthy of notice. Their meadow lands are all thrown up in beds, of the width of about twenty feet. I observed this management, particularly, on the plantation of Capt. Henry A. Watkins, who is a very successful cultivator of herds grass.

Mr. E's teams for ploughing, consist altogether of mules. He is an enthusiastic admirer of these animals, and uses them in his wagons, as well as to the plough. He adds his testimony to the opinions of all of those who have tried mules, for plantation purposes—that they are stronger, (when of large size,) hardier, longer lived, and less expensive to keep, than horses. Mr. E. has lately devoted much attention to the subject of hog raising. His hogs are confined, throughout the winter months, in pens convenient to water, and fed principally on corn. He gives them unusually large quantities of salt and ashes mixed, which, he says, they devour as greedily as corn. This preparation is deemed necessary to keep penned hogs in good health. Mr. E. showed me some very fine porkers, that he had penned through the winter, which he thought would weigh upwards of two hundred pounds a head, at eighteen months old. The pens are kept constantly well littered; and he estimates the value of the manure made in his hog pens, through the year, as fully equal to the value of the meat. *Mr. E. admits that the subject of manure making is his hobby;* but, I think that Taylor, in his *Arator*, makes nearly the same assertion with regard to the value of the manure raised from *his* hog pens. The pens are principally littered with leaves.

The plantation under review, has been greatly improved by the application of putrescent manures. It is the subject to which the energies of the farmer are principally directed. The proprietor has entered upon this subject with great zeal and enthusiasm. If all the manure, raised on his farm, were applied to the tobacco crop, he thinks it would manure two hundred thousand tobacco hills, or the whole of the land cultivated in tobacco. The leaves of the forest, swamp mud, alluvial deposite on the creek flats, the manure of the hog pen, of the stables, the farm yard, are all brought into requisition, to furnish their aid towards the permanent improvement of the soil. During my last visit to Mr. E's plantation, I found him engaged in a new and interesting branch of his subject. He had selected a large section of the thinnest part of an enclosed field, for the purpose of applying upon it loam from his creek flat. The spot selected, on the creek, was an almost inexhaustible heap of rich loam, many feet deep. There were two wagons, one team of mules, and two hands, engaged in hauling out this mud. While the driver was carrying off one load, the other hand filled the other wagon, which had no team attached to it, and as soon as the driver returned, he geared his mules to the wagon loaded in his absence, and left his own to be again loaded. By this process, an incredible quantity of mud could be carried out in a short time. The loaded wagon was drawn by fine strong mules. The loads were deposited in heaps, of a load each, four or five yards apart. Mr. E. informed me that he had ordered an ox cart to be made, for the purpose of aiding in hauling out mud and other manures. He said, he had determined to set apart two hands, whose sole employment, through life, should be to make, collect, haul out and spread manure, except when their services were much needed in harvest, and on such days as they were prevented, by inclement weather, from attending to their vocation. I asked him, if he meant that the labor of these hands should substitute the labor of his field hands, in making and hauling out manure. He said not: and that he meant to double his exertions with his field hands on this subject. If Mr. E's success in future, be equal to his success in raising manure for the last two or three years, it requires but a simple calculation to prove, that every acre of land on his farm may be made rich in a few years. The manure obtained from his hog yard, and the mud from his flat land, are resources but seldom availed of in this section of country, and seem to be deserving of attention by other farmers. Mr. E. is not alone in his exertions to raise large quantities of manure. The subject begins to command that attention, generally, which it so justly merits. The information obtained on this subject, by the circulation of the Farmers' Register, is convincing many of its great importance. Many farmers are asking the questions—"Why is it, that the farmers in the northern states, are reaping three or four thousand dollars nett profit, from farms of two hundred acres extent? Why is it, that many farms in France, of ten or fifteen hundred acres extent, support a thousand sheep and a proportionate number of neat cattle? Why is it, that the product of a Flemish acre exceeds the product of five of our best cultivated acres? Why is it, that land in the interior of the state of New York, as far distant from the large markets as our interior, commands a price of from sixty to one hundred dollars, that was originally poorer than the tobacco districts of Virginia?" The answers to these questions, are, *that they understand and practice the art of raising putrescent manures, and the artificial grasses.* It is true, that such great improvements have been partially effected by the application of mineral manures; but mineral manures are in the reach of more than half of the farmers of this state, and the resources for making putrescent manures, are fully sufficient to employ the leisure time and energies of those who are deprived of the aid of mineral manures.

Mr. E. defends, with great tenacity, his practice of suffering his corn stalks to remain on his fields, to be ploughed under with the wheat, instead of hauling them to his farm pen. His reasons, for this practice, are, that the stalks prevent his land from washing; that they benefit the land to some extent, scattered as they are, through the field; that it is unnecessary labor, to haul them up, because his supply of leaves is almost inexhaustible, and he can haul a load of the latter, in as short a time as he can haul a load of stalks; and he con-

siders the leaves fully as valuable. But, notwithstanding the plausibility of this reasoning, I will hazard the opinion, that it is an error in management, not to haul corn stalks to the farm pen. The planter is almost compensated for his labor in hauling them, by feeding them early to his stock. The loss from evaporation, when they are suffered to stand, or, when badly covered by the plough, (as they generally are,) is considerable; and, as an absorbent of the fugitive portion of the farm-pen manure, they answer a much better purpose than leaves.

Such a minute account of Mr. E's mode of managing his tobacco crop, has been given by himself in the Farmers' Register, [No. 1, vol. 4,] as renders any additional remarks unnecessary.

E.

From the Farmer and Gardener.

METHOD OF DESROYING WOLVES AND CROWS.

An extensive farmer of Kentucky has very politely furnished us with the following method of destroying wolves and crows:

"If you think the following information would be of any service to any of your subscribers, it is at their service. I have a mountain farm that would afford excellent pasture for sheep, but was so infested with wolves that it would have been very hazardous to have risked them there. In order to destroy them, we took an old horse and bled him in such a way as to make a trail of blood for about five miles; we then killed him, and having stuck a great many holes in him, put about a grain of stricknine into each hole. I also removed the skin off one hip and thigh, where most of the poison was put. The skin was dragged four or five miles, coming back again to the horse. All the wolves in the neighborhood would in this way be brought by the trails to the horse.

"Several dead ones were found near the horse, and they are very scarce in that neighborhood since. I shall repeat the experiment shortly.

"I have also killed all the crows on my farm in the same way. I took a quarter of veal and having cut up a portion of it into small pieces and mixed stricknine with them, I stuck many holes in the meat, and put one of those small pieces in each place. I also sprinkled stricknine over the meat, and then put the veal in a place where dogs could not get to it, and where the crows resorted, and in a few days there was not a crow to be seen on my farm, except dead ones, which could be picked up all over the place.

"For four or five years, I have killed *my crows* in the month of April, shortly after they had built their nests and become stationary, and am not troubled with them any more, until they begin to gather in flocks in the fall of the year.

"If a dog should by accident get poisoned with stricknine or nux vomica, an emetic of tarter will cure him. It will require a tea-spoonful or more to operate."

From the Boston Courier.

ON THE QUALITY AND GROWTH OF WHEAT.

From a late London paper, we learn that Col. Le Couteur an officer in the Jersey militia, has recently published a small work, "on the varieties, properties and classification of wheat." The details are the results of the writer's own experiments on his own property. Circumstances led him to make a collection of wheat; and in the course of five years' close attention and research, it increased to upwards of 150 sorts. To show the importance of attending to the varieties and properties of wheat, Col. Le Couteur mentions, that, among these varieties, there are some that will thrive better than others in the particular soils and situations adapted to each, all over the kingdom; that one ear of a superior variety, sowed grain by grain, and suffered to tiller apart, produced 4 lbs. 4 oz. of wheat; whereas, another ear, of an inferior sort, treated in the same manner, produced only 1 lb. 10 oz.—a proof of paramount importance of selecting the most productive and farinacious sorts of seed, the profit of sowing one sort, and the loss resulting from the other being manifest. The writer remarks that his attention was directed to this important subject, by professor La Gasca, Curator of the Royal Gardens at Madrid; that five years since, he accidentally saw about eighty sorts of wheat growing in a nursery garden in Jersey, some seven feet high, some only four, the ears of some being three, others six inches long; and that the professor explained their nature to him. He requested the professor to visit his crops, considering them to be as pure and unmixed as those of his neighbors. To the writer's dismay the professor drew from three fields, 23 sorts—some white wheat, some red, some liver-colored, some spring wheat, some dead ripe, the corn shaking out, some ripe, some half so, some in a milky state, some green. He hereupon became convinced that "no crop, in that state, could either produce the greatest weight of corn, give the largest quantity of flour, or make the best or lightest bread, such as would be produced from a field in an equal and perfect state of ripeness." He then selected the best and most productive sorts of wheat, and secured 14 sorts, which he afterwards cultivated with great care and success, showing the great profit resulting from this care and selection, and arguing on the immense consequences to the country, if attention to this subject could be made a national object. The modes by which Col. Le Couteur proceeded and succeeded, occupy large portions of the volume; but the paper from which we have drawn the preceding account, gives no further information.

From the Farmer and Gardener.

NEW METHOD OF PROPAGATING APPLE TREES.

A new plan for increasing plantations of apple trees, has lately been carried into extensive practice by the horticulturists of Bohemia. Neither seeds nor grafting are required. The process is to take shoots from the choicest sorts, insert them in a potatoe, and plunge both into the ground, leaving but an inch or two of the shoot above the surface. The potatoe nourishes the shoot, while it pushes out roots, and the shoot gradually grows up and becomes a beautiful tree, bearing the best fruit, without requiring to be grafted.

Whatever may be the success of the undertaking, its novelty is at least an inducement to give it a fair trial.

ON ARTIFICIAL GRASSES,

By John Taylor of Caroline.

From the Papers of the Agricultural Society of Virginia, in 1818.

It is universally agreed, that a constant impoverishment of land must ensue from tillage, without the renovation produced by manure and stable matter.

Hence the cheapest and most ample supplies of these renovations is a primary object; as neither the improvement nor preservation of the soil can be effected without using the means. It was seen, as early as in the time of Columella, that the efforts of nature to furnish us with these means, without the aid of culture and art, were incompetent to the end; and nearly equivalent in value, to the spontaneous supply of food by the wilderness, compared with the supply from industry and cultivation. Writers reason from this discovery as an axiom, and prove that the fertility of old countries bears a strict relation to the use made of it. Egypt itself owes its fertility to its annual alluvion manuring. Thus the culture of artificial grasses attracted great attention, wherever a system of agriculture existed, worthy of any degree of commendation; it being seen that the prosperity of nations, as well as of farmers, was evidently graduated by the degrees of skill and industry with which this axiom was practised upon; and that they were the chief means for its practical effect. Whilst a country is fresh and the soil saturated with vegetable manure, it constitutes a temporary case; and a vast extent of uncleared lands will long keep out of view the means of preserving the good, and improving the exhausted. But when it has passed the vigor of youth, and exhibits the marks of old age, the alternative of reducing it to barrenness, or of adopting the only mode in existence for restoring its fertility, lies before the eyes of its inhabitants. Excepting a few strips of alluvion land, there is no cultivated country, in which a dependance upon the natural grasses is more hopeless than in Virginia. A thin soil, exposed to hot and dry summers, not only prevents our lands from clothing and nourishing themselves, but has at length rendered them even unable to raise working animals for their own cultivation, and a sufficient supply of meat, milk, and butter, for their own cultivators. A remedy for this state of things is necessary to stop the emigration from Virginia and to prevent its ultimate depopulation. If the culture of artificial grasses is the chief remedy, it can only be overlooked, because it is not embellished by the glittering ornaments of novelty, and only assumes the plain garb of reason and experience.

Before the effects produced by a skilful culture of the artificial grasses, are enumerated, let us take a glance at them, collectively, in other countries. In Holland, where the cultivation of grass is generally preferred to that of bread, land sells higher as land, without having its price enhanced by adventitious circumstances, than in any other country. The industrious and profit-loving Dutch, choose rather to import than to raise their own bread-stuff at the expense of diminishing the culture of artificial grasses. They are as little likely as any people in the world, to make an election by which they would lose money. In England, the cultivation of grass is so much more profitable, than that of bread-stuff, as to have obtained a preference, at the expense of considerable importations of the latter. The bearings of this fact are weighty. Hay and butcher's meat in England are nearly of the same prices as in this country—whereas, wheat there, is often three times dearer than wheat here, and seldom less than double in price. Yet the English farmers prefer raising artificial grasses, to raising wheat. Again, the rent as well as price of land, is constantly highest in those countries, where the culture of artificial grasses is pushed farthest. In England, the rent of fine artificial meadows sometimes extends to twenty dollars an acre, rarely diminishes to ten, and is never as low as the rent of adjoining arable land, however good. As the rate of rent is settled by the rate of profit, it follows that even there, where the prices of meat and hay approach much nearer to our prices, than the price of wheat, it is most profitable to raise the articles of inferior price. Much light may also be extracted from a comparison between the general rate of rent here and in England. It must be our best land which would rent at one dollar an acre for a term of twenty-one years; and even at this low rent, both the land and the tennant are generally ruined. In England, much of the arable land rents at about ten dollars an acre, and its average rent is about six. But there, the culture of artificial grasses, is invariably mingled with the culture of grain. Now, when we see the best grazing land there renting higher than the best arable land, and their farms renting ten times higher than ours, does it not plainly follow, that both a great profit and vast improvement of the soil, must arise from the culture of artificial grassses; and that the differrence in rent between their farms and ours, is in a great measure produced by the latter circumstances? This conclusion is warranted by the fact, that the longer the term of a lease is, the higher is the rent there, and the lower here; because the tennant in one case calculates upon a mode of tillage, which will improve the land, and in the other, upon its becoming poorer. What, but the use of artificial grasses, and their exclusion, has made both these calculations correct?

Let us now resort to indigenous facts. Lands sell and rent higher in the United States, in proportion to the extent and skill with which artificial grasses are cultivated. There is no doubt but, that here, as abroad, profit is the only permanent basis of price and rent; and, as the highest price and rent attends the culture of artificial grasses, the greatest profits must also attend it. Both at home and abroad, the land nursed by artificial grasses, is known to be so much richer, and more productive, both of grain and meat, than lands not so nursed, as to pay labor far better, without taking into the account a long list of other benefits arising from this system of culture. The most productive bread-stuff farms, are those whereon grain is raised on grass leys. Of this fact, the slightest observation, experience, or reflection, would convince the most incredulous.

The general conclusion is, that grazing of lands, when applied to natural grasses invariably enriches it, when combined with a skilful management of artificial grasses, as in the cases of Holland, England, and some parts of the United States; suffices to excite those who

love their country or themselves, to inquire after the practical modes of a system, which experimentally enriches us both, and solicits an attention to the distinct items of profits, by which these desirable ends are produced.

1. The phrase "artificial grasses" implies a selection from the gramineous family, and a culture by human art, of the kinds best adapted to the soil and climate of a country, in preference to a reliance upon the grasses produced naturally. The great value of this selection, is illustrated by the contrast between the crab of the wilderness, and the cultivated pippin of the orchard: or by a comparison, between the esculents of a garden, and those of spontaneous production.

2. An improvement of the soil, by the culture of artificial grasses, arise from the vegetable matter of both root and top, when ungrazed; from the former when grazed; from protecting the ground against heat in summer and cold in winter; from producing food to raise animal manure; from rendering the ground fit to bear deeper ploughing, by reason of the mass of vegetable matter mingled with it, than it can bear in a naked state; by which its soil is deepened; and from saving four-fifths of the farm from the hoof and the tooth, by making one-fifth far more adequate to supply the demand for grass, than the whole without such culture. The profit, arising from this improvement of land by the use of artificial grasses, is exhaustless and incomputable.

3. Artificial grasses enable the farmer to raise meats of all kinds, for his own use or for market, of the best quality, in the cheapest modes; and to increase the size of all animals destined to slaughter or labor. The latter, by being raised in the climate where they are to work, are hardier, healthier, and better adapted for their employments. And, whilst the farmer saves the expense of purchasing sorry meat and teams, he gets good without expense, because by a skilful management of artificial grasses, the manure they cause domestic animals to produce, will more than repay in the improvement of soil and increase of crops, the expense of their maintenance. This item of profit is too important to be hastily passed over. Men chiefly subsist upon grain and meat; brutes, upon grass green or dry. The difference between the expense of cultivating an acre of grain and one of grass is considerable, and yet the latter will raise far more meat, butter, tallow, leather and wool. Let any farmer calculate the expense of supplyng himself with these articles, in the present mode, even excluding its heaviest item, (that of injury to the land,) and he would probable disvover that most or all of them he raises, cost him three times their market value. The loss however upon what he sells is trifing, compared with the loss upon what he uses; because he consumes much and sells little. When the temporary supplies from the western country diminish or fail, the evils attending upon our present mode of raising stocks, will acquire no proof. The arts of agriculture are as necessary to improve and increase the sustenance of beasts as that of men. Grass being the basis of food in the case of stocks, as bread-stuff is in the case of of man, that mode of obtaining it which produce, the most and best, with the least injury to the lands and from the smallest space, is entitled to a preference. Without the cultivation of the artificial grasses, our domestic stocks occupy the precise ground occupied by mandkind, when excluded from the artificial modes of raising bread-stuff, and experience the fate of a state of agriculture, as to them uncivilized.

4. The artificial grasses produced a considerable profit by saving labor. If the labor applied to an acre enriched by artificial grass, was equal to that expended upon an impoverished acre, a vast saving would still result from the difference of the crop; as the expense of labor must be computed in relation to its produce. But the fact is, that the poor land requires the most labor, whilst it produces the worst crop, because being filled with seeds of worthless or pernicious annual-grasses or weeds, and being incapable of bearing a ploughing sufficiently deep to deposit these seeds beyond the reach of vegetation, it requires double the work to destroy them as they sprout and grow after every rain, which would suffice if they were extirpated. This cannot be effected on poor land without killing it. On such, the wheat which follows corn, though the corn required and received six or seven workings, is always more infested with annual grasses and weeds, than that sown upon only a single furrow turning under good perennial grasses, because they smother all annuals, and any seeds of the latter remaining, are buried by one deep ploughing, which the earth is able to bear, below the reach of vegetation. Hence in the culture of corn upon a perennial grass lay, as in a fallow for wheat, half the labor required by poor land may be saved, because as but few of the annuals appear after one deep ploughing, and as the perennials hardly appear at all in the summer, very little culture is required; and the the crop is not only increased by the artificial grasses turned in, but by being free from the frequent laceration of its surface caused by the frequent ploughings designed to keep under the quick growing annuals infesting thin land. The wheat also following corn planted on a perennial grass ley is cleaner; for although the perennial grass seeds will often sprout in the spring, and although they ought universally to be sown with or upon the wheat, yet a providential aptitude for the benefits they bestow, is discernible in their slow growth until the wheat crop is perfected; whereas the annuals often grow as rapidly as the wheat itself. There are many weighty items of profit belonging to the labor-saving article, by the culture of perennial grasses. By diminishing arable space, whilst the crop is increased, the diminished space consumes less labor. From the division of the objects of labor, a succession of employments ensues, enabling a farmer to prevent either from suffering by the want of cultivation in due season. For instance—a full crop of corn and wheat, or a crop equal to the whole labor on a farm, is the consequence of comparing labor with space; and a great demand of both crops for labor at the same period, especially if aggravated by unpropitious weather, generally produces some neglect, and often a considerable loss. By diminishing space, not only without diminishing, but actually increasing produce, these crops will be more manageable by the labor, and receive a better cultivation. And the time saved by this diminution of space is moreover profitably employed early in the spring, in applying manure and sowing grass seeds; pre-

viously to the wheat harvest, in making hay; in autumn in ditching, draining, fencing and stubbing; and at all times in a variety of less important, but improving occupations. Thus the losses accruing both from the surplus of labor at one season, and from its deficiency at another, are avoided. Some labor is saved by the effect of the roots and tops of perennial grasses, to keep the ground loose and friable; and much after it is thrown into the high ridges of five and a half feet width, because when the ridges are reversed, very deep ploughing is more easily practicable, by turning the earth back into the furrows without working at all on the space those furrows occupy. By the friability of the ground, resulting from a great quantity of vegetable fibres, we are also secured against its baking, and save the labor necessary in that event, for crumbling or reducing it again into a proper state for vegetation. Naked ground possesses neither of these advantages. It is unable to bear the deep ploughing necessary for forming proper ridges, and it is liable both to wash and break from heavy rains, so as to require much severe labor again to level and pulverize it highly prejudicial to the crop.

5. But the greatest benefit from the cultivation of artificial grasses, arises from their exclusive capacity to make highland meadows. Some grasses are so well adapted for high, dry and hilly land, if the soil is improvable, that it may very often be made more valuable and more productive than low land meadows. The expence of clearing and draining the latter, will generally exceed that of manuring the former; yet draining is considered every where as highly profitable and useful. The comparative expence between that and making high land grass, is not materially affected by the probable comparative profit. A good spring crop of high land grass is more common in our climate, than of low land. It is not exposed to inundation. A pound of high land grass, green or dry, generally contains as much nutriment as two of low land. It is more easily made into good hay. And high land grasses possess the great exclusive value of enriching the high and dry lands on which they are sown. These conditions disclose items of profit, resulting from the culture of artificial grasses, which, when united, warrant the conclusion, that it is capable of rendering a great proportion of our high, dry, and hilly lands as valuable as reclaimed meadow land.

It is next to be considered what grasses are best adapted to the soil and climate of Virginia, and consequently most worthy of selection. The merit of red clover as an improving high land grass, is too well established to require proof. Its defects are, that it is speedily destroyed by grazing; bearing, however, that of hogs the longest—that in our warm and dry summers, it soon perishes without being grazed, especially on sandy soils—that it is difficult to be made into hay—and that its hay can only be preserved by particular exertions. It stands, however, hitherto unrivalled in its capacity to enrich the ground, if left uncut to be turned in by the plough. Timothy, in the lower parts of the state, especially if grazed, is also liable to an early death; to be eaten out by broom-straw; to have its leaves burnt and dried by the sun before it is fit to cut; and to ripen so late as to incommode the wheat harvest, without possessing the quality of waiting long for the scythe. In the section of Virginia below the mountains, it must also be assigned to the class of low land grasses. The red top, or herd's grass, as it is indiscriminately called, is superior to timothy in many respects. It lasts longer; it bears grazing better; its leaves are not so liable to be sun-burnt; it resists invaders much more powerfully—sown, mixed with timothy, it eats out the latter in two or three years. And although, it ripens about the same time, it waits longer for the scythe, without sustaining any considerable injury. This grass, like timothy, is better adapted to reclaimed low lands than to high; though it succeeds on the latter better than timothy. The best grass which I have tried, in many respects, is one commonly called "the high land meadow oat." I have had no means of ascertaining whether it is a species of rye grass, or of the avena pratenris, or neither, nor whence it derived rhe appellation "Peruvian," by which I have heard it distinguished. With its qualities I am better acquainted, having carefully observed them for many years. It ripens as early as the red clover, and is easily made into fine hay, if cut in proper time. Its earliness is of vast importance in our climate. Thence it happens, that it produces heavy spring crops, like red clover, as it commonly perfects its growth before a drought occurs. It is the hardiest grass I ever saw, and bears drought and frost, heat, and cold, much better than any I have tried. It keeps possession of the land in spite of severe grazing. It flourishes best on soils suitable for red clover, but it will live on and improve lands whereon red clover will perish. It furnishes better grazing early in the spring, late in the fall, in droughts and in winter, than any grass known to me. Ripening with the red clover, it is peculiarly fitted for being sown with it, because it greatly facilitates its conversion in hay, and retains possession of the ground for years after clover has disappeared. Alone, cut before the seeds ripens, its hay is as nutritive and pleasant to stocks of all kinds as any I ever used; and it will yield both seed and tolerably good hay at one cutting, as it ripens soonest at top. Mixed with favorite grasses of grazing animals, it is partially rejected, but eaten as they fail. Alone, it is greedily fed upon. After being cut or grazed, if left to grow, it rises anew, almost with the rapidity of lucerne, with a vigor but little diminished. Fifteen years' experience has not enabled me to decide as to its capacity for improving the soil, because the small quantity of seed first obtained, by confining experiments to small patches, long concealed its qualities; and the large lots first sown have remained too flourishing to require manure, and too valuable to be ploughed up. It produces (after it has come to perfection, in doing which it is one year slower than red clover,) ungraized and uncut, a warmer and more lasting cover than the clover, which has recently induced me to mix and sow it with wheat on a large scale, for the end of improving the soil; in which the anticipation I have yet discerned no cause for apprehension. For this purpose it possesses one recommendation beyond clover. It does not grow and spread so rapidly in the fall or spring as to injure the crop of wheat with which it is sown, as is sometimes the case with clover. Upon the whole, whatever doubt remains as to its fertilizing power, the conclusions that it eminently

possesses the qualities for lasting, grazing, and making high land hay, may, I think, be confided in. But it does not, so far as my trials have extended, succeed in lands originally wet, however well they are drained.

As the end designed to be produced by the previous observations, comprises their value, a plan for the management of a bread-stuff farm, combined with high land meadows and artificial grasses, is the remaining subject suggested for consideration. Let us suppose a farm to consist of one thousand acres of arable land; that the greatest produce of bread grain, not in one year only, but in a course of years, is the chief object; and that the labor on it is adequate to its cultivation in the three-shift mode, that is, to having two-thirds of it annually in corn and wheat. To discover whether the profit to be expected from this style of cultivation will be equal to that arising from the system presently to be proposed, we must first glance at its defects. It impoverishes the soil—grass seeds cannot be beneficially sown with or upon the wheat crop, because the land is too poor to nourish them, and their destruction by the plough returns too rapidly. Pasturage is scarce, bad, and impoverishing to the land; and the farmer is thereby disabled from raising within the farm, teams, meat, milk and butter, for his own consumption and comfort, and moreover exposed to considerable annual expenses to supply the deficiencies. The labor being computed by space, and not by produce, and a great demand for it being concentrated in one portion of the year, losses accrue from its insufficiency to meet temporary pressures, and at other seasons for want of beneficial employment. The crop computed by the acre, is upon an average, surprisingly small, whilst as much labor is necessary for its cultivation, as, differently managed, would, in a few years, increase it per acre, four-fold. Let us contrast this abridgement of the three-shift system, with an abridgment of that proposed to be substituted for it.

Let eight hundred of the supposed thousand acres be divided into four-shifts of two hundred acres each, one to be annually cultivated in corn and sown in wheat, so that two will yield a crop every year. As much as possible of each shift should be manured the year it is planted in corn. This may be extended in a few years to one hundred and thirty acres, (exclusively of the twenty presently mentioned,) by ordinary management. Clover should be sown on the wheat in the spring, or meadow oat with it in the fall, and these eight hundred acres should remain ungrazed; of course, four hundred lie untouched for two and a half years, to allow time for a large produce of vegetable matter, devoted to the improvement of the soil. Let the remaining two hundred acres be appropriated chiefly to grass, and be divided into ten equal lots, one to be highly manured annually, and cultivated in pumpkins, potatoes, peas, cotton, turnips, or any cleaning crop, to be followed by wheat and grass seed, if these crops are gotten off in time to sow wheat, or by oats and grass seed, if they are not. Thus two lots, or forty acres of this portion of the farm, will produce each year heavy and valuable crops, whilst a rotation will be established, sufficient to keep the grass lands clean and in good heart. Three of the other eight lots ought annually to be cut for hay, and five to be reserved for grazing, out of which last number should be annually taken the lot to be manured; so that none will sustain above five years' grazing before it is recruited. The five lots devoted to that service ought to be grazed in succession, both to alleviate impoverishment it produces and to increase the produce of grass. He who aims at agricultural perfection or elegance, will divide these ten lots by ditches and live hedges of holly or cedar, (the former a conjectural, the latter a tried plant,) or at leat by the usual fences. Even ditches alone would be of some use. But, in the infancy of improvement, attendants of old men, women, or children, are a tolerable resource, producing also the good effect of habituating the last in early life to employment, and advancing their health, with the precaution of folding the cattle in bad weather. This temporary resource is, however, greatly inferior to enclosures, particularly to the living or imperishable. Under this system, product, instead of labor, will soon be computed in reference to space; and bad agriculture, being detected by the miserable crops this mode of computation will disclose, will shrink gradually out of sight, through shame. The means of raising manure, and the most beneficial employment for teams and manual labor, will soon present themselves in those seasons of the year now lost or trifled away. I speak not from theory when I say, that the farm well managed, according to this system, will, in twenty years, at least return back to its original fertility. I add, as an inference from this fact, that supposing contiguous farms of one thousand acres each, one in the usual state of impoverishment and the other in woods; the former to be thus managed, and the latter in the customary mode, with the same amount of labor; that the proprietor of the first would make far more profit, and find his land at the end of his term of far more value than the proprietor of the latter. If these rival farms were in an equal state of impoverishment at the commencement of the experiment, I have no doubt but the first would produce three times as much bread-stuff in twenty years as its rival, independent of its inferior productions, and of its exclusive improvement.

A great annual increase of manure is the soundest test by which a farmer can discover whether he is successfully practising the proposed system or not. On the area from which it was taken, five acres were hardly manured eighteen years ago, and now the resources of the farm alone sometimes reach to one hundred and fifty. It is a bread-stuff farm, and grass is used in strict subserviency to that object, for the purpose of enhancing its profit. If gypsum, marl, a neighborhood to towns, or any other adventitious mode of enriching land, can be added to the supply of manure on such a farm, the process of improvement, and the gratifications of increasing profit, may be accelerated.

The large area upon which the proposed system is calculated, is no obstacle to its application to any other. Its proportions may be applied to a farm of any size. This scale was adopted for the purpose of awakening the best informed order of farmers to the calls of patriotism and self-interest. Intelligence effects great objects by reflection; ignorance from immitation; and though a prosperous state of agriculture depends much upon small farmers, because they possess by far the

greatest portion of the national lands, perhaps also of the national industry, its introduction depends upon the successful example of the large ones, who have time, capital, and talents, adequate to the cultivation of a science abounding in difficulties, and requiring no small degree of reflection. The merchants of Scotland who had retired from trade, began about fifty years ago to assail, by precept and example, the then execrable system of agriculture habitually practised in that country, and have supplanted it by another, which has diffused a rich surface over a great space, previously occupied by a cadaverous degree of sterility. As we neither love our country less, nor confess an inferiority of intellect, an equal share of effort and perseverance by gentlemen, farmers will certainly be crowned with as much success as the efforts and perseverance of these gentlemen merchants, since our auxiliary advantages of soil and climate are greater. They effected their patriotic design, chiefly by the introduction of the artificial grass culture; and when we consider the favorableness of our climate for great spring crops of grass, frequently demonstrated by as heavy crops of clover as we hear or read of, and also its favorableness for converting them into hay, no reason exists for despairing of obtaining the wonderful state of fertility which a country, less favored by nature, has acquired by the same means.

I admit that a farmer may make a less crop than usual, the first and second year after he adopts the recommended system, unless he begins with a due attention to manuring; but I deny that his profit will be less, because his dimminution of crop will be more than compensated by the improvement of his land. An average of the first four years will probably produce a crop numerically equal, at least, to his usual crops; but then his profit will be greater, because having raised it from less space, he will have saved much labor for improvement, and his land will be in better heart. Afterwards his crops will numerically increase gradually to an extent I cannot foresee. Should a man calculate by his hopes of life and chance for self gratification, without any regard for contemporaries or posterity, he ought to adhere to the prevalent system of agriculture, if he expects to live two years only; if but four, his determination may admit of some doubt; but if he expects to live longer, it ought to admit of none. Even principles so narrow, will dictate to him an abandonment of the present land killing habits. A calculation which looks forward but two years, cannot possibly procure success for any agricultural system, except one for exhausting the land as soon as possible. All men who calculate on so short an interest in the product of land, will strive to increase it to the utmost extent, at the expense of of the land itself. A proprietor, sure of dying in one or two years, would improve but with little spirit, though his land was to descend to his children; but, a possessor for one or two years, likely to lose the land and live, must feel a great lassitude in improving for future profit, which he cannot reap; united with great excitement, to reap as much as possible from land which he cannot keep, for future enjoyment. No good system of agriculture can possibly take place, under the suggestions of these impulses.

I admit also that disappointments will happen from feeble and unskilful trials. Complete success will too often be expected from partial attempts. The imagination can magnify the disrupted toe of a statue, into an entire image, and brood over a fragment with self-complacency: and fanaticism can expect wonders from relics transmited from ignorance; but it is to be hoped that such cases will be rare in this age of intelligence and free enquiry; that the prejudices imbibed from old habits will be exploded, and that the industry and good sense of the Virginians will rapidly improve all suggestions, the tendency of which is to preserve their country from decay, and themselves from indigence.

An observation is reserved for the conclusion of this essay, to face an opinion, not less erroneous than common; and not less hostile to profit, than to improvement. It is too often imagined, that a rotation requiring the interposition of artificial grasses between exhausting crops, is slow in its return of profit, and demands an extraordinary capital, to supply, for a time, the necessities arising from this delay. But, from long and attentive observation, I have confidently concluded, that no crop requires less capital, than these grasses, or is equally rapid in its returns of profit. The labor which cultivates other crops, prepares the ground to receive grass seeds, and they are mingled and sown with grain. Seed is, therefore, nearly all the extraordinary capital this system needs, when the artificial grasses are grazed, or devoted to the enrichment of the soil; and the expence of converting a portion of them into hay, though not as trivial, is yet inconsiderable. The returns of profit, are infinitely more copious and lasting, as well as more rapid, than those made by any other crop. They suddenly yield milk, butter, cheese, meat, wool and leather. Manure, an increase of grain and other crops, and good working animals, soon follow. At every rotation, when ploughed in ungrazed, they present to the farmer an improved soil, without causing additional expense, or requiring additional labor. On the contrary, so far as artificial grasses are thus used, they save him more labor in the single article of fencing, than they consume. And finally, the profit of the system becomes so incorporated with the soil, whilst it is also enjoyed by the reaper, as both to last long, and annually to generate profit upon profit, in a ratio out-stripping the fecundity of compound interest.

ON THE BENEFIT AND PROFIT OF USING OYSTER SHELL LIME.

To the Editor of the Farmers' Register.

As you express a desire to hear from me, though I should not place my real and proper name to my communication, I take up my pen to say something of my late use of lime. Let me, however, say to you, that your opinions of communications without proper names, are not sound, or well grounded. Why, sir, should Jeremiah, or X. Y. Z. give out his proper name, like a tub to the whale, to be spouted and blown about by idle thin-skinned farmers, or readers who know nothing practically of the great and important subject of agriculture? Is it not sufficient that your readers have the practice, and the opinions derived from practice, given to them gratuitously? If Jeremiah seeks not glory, or fame, or high place, can he

not be permitted to contribute his mite of experience to the general good, without being bored for his name? If he be contented to live up to the great eternal law to "till the earth in sorrow, and eat of its bread by the sweat of his brow," why goad him for his want of boldness? Is the truth greater with one name than another?

But to the claims of lime. I will not give you *all* I see and *all* I believe of its power and influence, for I could not expect that your readers would believe, nor could I expect them to ride and look and judge for themselves. Let it suffice, as that the breaking of the "sixth seal" is the resurrecting power to all that is dead, so is the application of lime to land. That which had died under the barbarous hand of man, has awakened in animation and joy. Corn, wheat, grass and weeds, wanton in their health and strength; and methinks in wending my way through them I can hear their song of praise to the great First Cause. I have invited my neighbors to look, and bear me witness of this earthly resurrection, but they hear not—no, sir, nor will they believe, though there are "green purses and glittering gould" in the resurrection which I preach, their "dull cold ears" heed me not.

I apply about 50 bushels of shells to the acre, and sometimes more, when I have it, and am able, by great efforts, to lime all the land I cultivate. I have to haul the shells from 6 to 8 miles. They cost me when brought from the banks at the mouth of the Potomac to the nearest landing, 5 cents the bushel; then to land them, and cart them home, 7 cents; to burn and spread them, 8 cents; which makes the whole expense $10 per acre. This is all in advance, and in trust to mother earth: but her's is the *best pay* under heaven. In 12 months you have your money returned, and your land worth three times its previous value. Nor is this all; plaster, that once worked miracles, had ceased to be of any avail. From 1800 I have used it extravagantly—say from two to ten bushels per acre—and for the last 12 years it had done little more than made the vegetation green. Since liming my land, the plaster has regained its power; and is, if possible, more to be desired than ever. Lime, however, like plaster, may not be used upon wet land. Let your young farmers look to this; for it is my belief that on account of failing from this cause in the use of lime, 25 and 18 years ago, I have not lost, in profits and improvements, less than $2000 per annum. I may now impute more to lime than I should; but, speaking from experiment, I cannot be far from the reality. It was your valuable book upon *Calcareous Manures* that induced me again to try it; and though, like Moses, I have lived upon hard work, and hope, for near 40 years, I think I shall yet realize more than a bunch of grapes. With many thanks to you sir, and to your valuable correspondents, I subscribe myself, as of old,

JEREMIAH,

Or, as I am a resurrecting man,

LIME.

Fairfax Co., June 25, 1837.

From the Genesee Farmer.

SURE AND CHEAP WAY TO DESTROY RATS.

Mr. Tucker—I was present a short time since when one neighbor was complaining to another that the rats were very troublesome. The other said he had got rid of his rats without much trouble. Says he, "I buy a hundred small fish hooks for a shilling, and take a small pine stick and slightly fasten six or eight hooks to it—the points all one way—and put the sticks in the rats' hole, so that when they run into the hole they will rub against the hooks will catch into the skin and with a little exertion they clear the hooks from the stick, and go off, squealing, with the hooks fast in the skin, and a few rats so hooked will give warning to others, and they will soon all disappear. Try it and you will not be disappointed."

RAWSON HARMON, JR.

Wheatland, May 17th, 1837.

ON BUCKWHEAT AMONG CORN.

To the Editor of the Farmers' Register.

Carysbrooke, 21st June, 1837.

The season for sowing buckwheat being at hand, I would recommend it as an improver. For some years past, I have used it on such portions of my corn-field, as required a meliorating ley, with decided benefit—both as a fertilizer and opener of the soil—sowing from the first to the last of July, (according to circumstances,) from a peck and a half to two pecks to the acre, covering the seed (at the time of *laying-by* the corn crop,) with cultivators between the rows, and with hoes between the hills of corn. Sown at this season, I have found that the buckwheat will rise two feet on *ordinary* lands, flowering and maturing abundantly. Its effects, on wet and stiff lands, are to absorb all surplus moisture, and to mellow the soil, insomuch as, that I have seen lands of this description broken in fine order for wheat, whilst, that adjoining, of a much more kind character, (not sown in buckwheat on *that account*,) would exhibit a cold and clammy condition—the result of the succeeding wheat and clover crops confirming the promise of the buckwheat preparation.—Its advantage on blue grass lands is very evident—smothering it during vegetation, and facilitating the rotting process after the sod is turned under. These, (by the way,) I have found the most powerful agents in the destruction of this most formidable of all pests, (having never seen the *Canada thistle*,) as, delighting in sun and air, it abhors shade and the *exclusion* of air. I have destroyed the most inveterate blue-grass turf, by a thin covering of long litter, or wheat straw, with a bushel of plaster, to the acre, turned under in April, by four-horse ploughs, followed by rollers. But, to return from this digression to buckwheat: its great excellence is in the cheapness of this improver, and in there being no substitute for it as a dressing among corn. The first cost, in the mountains, is from 62½ to 75 cents per bushel.—The expense of sowing and putting in, is *greatly* more than compensated by the benefit of the cultivation given to the corn. Peas, nor any other substitute with which I am acquinted, would be sufficiently matured, sown at this advanced season, to constitute a valuable manure. It has been objected to buckwheat, that its volunteer plants infest the *wheat* crop. I have never found this complaint worthy of consideration.

A. M HARRISON.

For the Farmers' Register.

THE TRUE PRINCIPLES OF AGRICULTURAL AND NATIONAL PROSPERITY CONCISELY STATED.

[We are rejoiced again to hear, though as yet but indirectly, from our former correspondent, George Henry Walker, Esq., of Philadelphia county, who has but lately returned from a visit to England. For the following notes we are indebted to one who was an agricultural pupil of Mr. Walker's, and who, besides, has well studied agriculture, by reading, and extensive travel and observation, as well as by correct, though not long practice, at home. The simple propositions here presented, concise as they are, will serve to throw light on the letters of Mr. W. in vol. iii., (at pp. 536, 539, 600, and 601,) and prevent their continuing to be to many readers no less enigmatical than amusing. The several parts of this general statement may also serve as texts for future particular and extended pieces of discussion or practical instruction, which we indulge a *faint* hope of having in Mr. Walker's own vigorous and impressive though excentric and discursive language—and a more confident hope of similar communications from his friend and pupil. From the private letter of the latter, we will take the liberty of quoting the following explanatory introduction.

Philadelphia, June 24, 1837.

"Inclosed you have a copy of 'some extracts from the manuscript notes of a farmer.' They were furnished to me by Mr. Walker, in consequence of our having had much conversation together on the subjects to which they refer, and without any restriction as to the use I should make of them. I have copied them for publication in the Farmers' Register, from a belief that they may serve 'to pave the way' to a right understanding of a further exposition of the principles on which his farming is based, and to a due appreciation of his practice, should he furnish you with an account of them."

We may here state that it was Mr. Walker's practice in regard to making manure which was referred to, and in part described, at page 78 of this volume of the Farmers' Register.

The great and all important truth which is sustained by the reasoning of Mr. Walker, and which is entirely conformed to by his practice, is, that unless the general system of agriculture of any nation gives more to the land than it takes away, not only the prosperity of agriculture, but the prosperity of the nation, and the comfort and happiness of the individuals composing the nation, must decline: and this truth, though it would not be denied by any one, is neglected and opposed by the general practice of all the cultivators of the western, and nearly all of the southern states. Individuals may yet for a long time continue their former and present course of wearing out and destroying the fertility of one piece of land, and then flying for refuge from the evils which they have produced, to other new lands, to renew their acts of plunder and destruction; and not only single farms, but even extensive regions, may be thus wasted and then deserted—as has been going on to an awful extent, in lower and middle Virginia. But there must be a limit to this course, when our country will no longer offer new spaces and subjects for these plunderers and destroyers—and an impoverished land must make an impoverished and a miserable people. To this most calamitous termination, the general system of agriculture in the far greater part of the United States, is manifestly and strongly tending; and the only possible means of avoiding that end, is to enforce and command regard to the truth, that every individual cultivator, as well as the whole nation, will be most profited by feeding and enriching the land, instead of taking from it as much, and returning to it as little, as possible.—Ed. Far. Reg.]

The real essential, efficient causes, and means of national prosperity, advancement, stability and *permanence*, are the people being duly fed, according to the organization of man, and the different occupations being duly proportioned to each other, according to the *natural* tastes and capacities of each to fulfil the natural wants of each and of all.

These two great and primary laws of man's existence and organization, are best and most duly and fully observed in England and the United States.

For nations to be *duly and legitimately* fed, they must be legitimately and duly *proportionately* occupied and employed, (according to the natural tastes and capacities of each individual,) in agriculture, manufactures, commerce, the arts, &c.; and to be duly and legitimately occupied and employed, all must be duly and legitimately fed.

As they are duly and legitimately fed and occupied, so is the *increase* of *population* the cause and the means of the improvement of the fertility of the soil, and the consequent *increase of food*. Hence the rise, advancement, prosperity and *stability* of England and the United States, so far above all other nations, ancient and modern—these laws being best observed there.

As they are *un-duly and non-legitimately fed and occupied*, so is the increase of population the cause and the means of the deterioration and exhaustion of the soil, and the consequent *decrease* of food. And hence the real cause of the "decline and fall" of *all* ancient empires.

If the modes of living and occupation, produce deterioration and exhaustion of the soil, a nation *must inevitably* "decline and fall," after it reaches a certain amount of population. *Increase* of population *then* (being un-duly and non-legitimately fed and occupied) produces decline with accelerating velocity.

The prosperity of agriculture, and consequently the prosperity of nations, depends upon the mode in which the population is fed—in other words, upon the rate of wages. With low wages, a nation can never be either permanent or prosperous.

The rate of wages depends upon the extent of knowledge and freedom, and the extent of the developement of manufactures and commerce. Without these, agriculture must be in the lowest possible condition, and, consequently, wages must be at the lowest rate, and population must be in excess—being unemployed and ill fed—the soil, consequently and inevitably, deteriorating in fertility.

Pauperism is the result of ignorance, want of employment, too low wages, improvidence and drunkenness—disease and accidents, &c. But

mainly, it results from *too low wages*, producing undue modes of subsistence—this producing deterioration of the soil—and from the undue proportions of occupation, this producing want of employment—*all these* producing and increasing each other. Hence, as we break the laws of nature, we suffer accordingly. The laws of our organization must be observed—and *with which* the laws governing the production of food, are in strict and exact accordance.

Man, is organized to subsist upon *animal and vegetable* food, *in all their varieties*, in certain proportions. The production of food is in accordance with that organization; its full and perfect production, being in the order of its legitimate consumption.

Those crops which return the *most vegetable* matter, and animal manure, to the soil, are required to be grown in by far the largest proportions; those which return the *least*, in the smallest. All existing and previous practice have been more or less the reverse.

Grass crops are required to be grown the most, according to the organization of man, and the corresponding true and legitimate laws of vegetation, and the production of food. Their varieties are the most numerous; their period of ripening, is the longest; they endure the longest in the soil; their cultivation is the cheapest, and most economical; and, above all, they return by far the most vegetable matter, and animal manure, together, to the soil. And, more especially, compared with other crops, if the produce is removed from the soil, they still return, infinitely the most *vegetable* food, to the soil, of all other crops. In this, consists their great essential, indispensable, and most important value, and superiority. Most other crops, with the exception of root crops, consumed on the land, return only a little straw to the soil.

Those crops which return *nothing* to the soil, as flax, hemp, tobacco, &c., are required to be grown in the smallest proportions. Cotton, sugar, &c., in larger proportions. Wheat, barley, &c., in still larger. Grass, roots, and green straw (or cattle) crops combined, are required to be grown the most—they being the main essential means and principles of fertility. Grass is required to be grown the most of all, being the most fertilizing and the most economical of all crops, under all circumstances, and is the most required for cattle, sheep, and horses, to supply and maintain the legitimate wants of man, and the due fertility of the soil.

The more the legitimate wants of man require a crop to be removed immediately, directly, and remotely from the soil, the *less* bulky it is, and the *less* vegetable matter and animal manure it returns to the soil; and, therefore, in the same less proportion is it required to be grown; and, hence, grass and cattle crops, are required to be grown the most, and they are organized to be so. Grass crops are the most economical of all crops in their cultivation. If consumed on the land, their cost of cultivation is comparatively nothing, and they are the most fertilizing—therefore, they are required to be the *most* grown. One-fifth of an acre will supply an individual with bread; four, five, or six acres are required to supply the same individual with *animal* food. In something like these proportions, are the different crops required to be grown, according to their fertilizing and non-fertilizing properties.

We cannot cultivate this crop, and reject others, as we please, with impunity and success. We must cultivate them *all* according to soil, climate, and situations, and as the wants of man require them in accordance with his organization. The laws of vegetation are in strict accordance with the laws of man's mode of subsistence. The food of man, being duly cultivated in this order, each crop affords certain proportionate means of increasing the productiveness of the succeeding ones, and with the greatest possible economy of labor and time. The chain of these laws must be preserved entire and unbroken. The more they are developed, the more beautiful, simple, and perfect they will be found to be. All crops are for the use of man, directly, or indirectly, and they must all be cultivated. As they are cast aside, so will the system of agriculture be defective and deranged. In all we do, we must begin with first principles; as we fail to develope these, we fall into error.

All crops are required to be grown in the exact proportions as they possess the power of increasing the fertility of the soil. Grass, and cattle crops possess this power in the highest degree—manufacturing crops, the least.

Grass crops, duly cultivated, supersede the necessity for the growth of weeds. Weeds are for the purpose of restoring to a certain extent, the lost fertility of the soil, when unduly cultivated. They increase, as that cultivation is defective in principle. The different kinds, likewise, indicate the state and condition of the soil, and what improvement it requires. They are of material assistance to the bad and ignorant farmer, and sure and essential guides to the intelligent and improving one.

The laws of *population*, subsistence, production of food, and occupation, are all in exact, just, beautiful and harmonious proportion and accordance with each other.

The Malthusian theory implies that the Creator has left a part of his laws defective and erroneous; and that man has the power to remedy and correct them—but only by outraging other laws. This cannot be. It is impossible that the gloomy, appalling, and disheartening theory of Malthus, can be inherently true. But it is obviously true, as long as the laws of subsistence, occupation, and production of food, are outraged, neglected, and broken.

Malthus only saw the *law of population* in force; he did not see that the laws of subsistence, of the production of food, and of occupation, were broken, or unduly observed. Hence, *all* his facts are deduced from the existence of actual *decreasing* production of food, with increase of population—hence the *real* truth of his theory, under *these* conditions of society. If all these laws are duly observed, the increase of population becomes the means of increase of food. As they are unduly observed, decreased production of food attends increase of population.

That the law of the production and increase of food, should be, and is, in exact, just, and harmonious accordance with the law of the production and increase of population—*when the laws of subsistence and occupation are duly and legitimately observed*—is obviously a principle in most beauteous harmony with all the other laws of the Creator. Being the noblest and most important, a part of the universal system and principle, that

the means are invariably adequate to meet the required ends and wants.

The causes why grass and cattle crops should exceed grain and manufacturing crops, are these.

Man is organized to subsist, as that they should do so.

The laws of vegetation require that they should do so.

To supply each individual with his legitimate food, requires much more land in cattle than in grain crops.

Vegetable matter, and animal manures, are the essential principles of fertility.

Grass crops greatly exceed the grain crops in variety, and the period of ripening for harvesting.

They are much more economical in their cultivation.

They endure much longer in the soil.

GEORGE HENRY WALKER.

AVERY'S ROTARY STEAM ENGINE.

To the Editor of the Farmers' Register.

In your last number, I notice a request for information concerning the rotary steam engine. I presume you allude to "Avery's Rotary Engine," which is in extensive use in the north and west, for driving saw and grist mills. In compliance, therefore, with your wishes, I send a number of the "American Rail Road Journal," for February last, containing a description of the engine, with certificates of its power and performances. I had another number which gave a more particular account of it, but I am unable to lay my hands on it. From extensive inquiry, I am induced to believe that, for the purposes above mentioned, Avery's engine is superior to any other in use. It has, likewise, received the very favorable notice of the editor of the "Journal of the American Institute."

Yours, P.

From the Rail Road Jonrnal.

The constant applications from all parts of the country, for information in relation to this wonderful machine, induces us to give such facts in relation to it as come within our knowledge.

The following letter signed by four gentlemen of the highest respectability and intelligence, residing at *Ithaca*, Tompkins county, N. Y., gives the facts and impressions of a short visit to a saw-mill, erected by Abraham Bell, Esq., of Jersey city, and Seth Geer, Esq., of this city, in the midst of a *pine forest*, in Tomkins county, eleven miles from *Ithaca*.*

Ithaca, N. Y. Dec. 13, 1836.

To D. K. MINOR,

SIR—In compliance with your request, we cheerfully give you our views and opinions of the performance of Seth Geer and Abraham Bell's saw-mill, driven by "*Avery's Rotary Engine*," situated in the town of Enfield, Tompkins county, New York.

The simplicity of the Engine, and consequently the ease and facility with which it can be managed by persons of ordinary intelligence, and who would be wholly incompetent to work a piston engine, first excited our attention; and upon a careful examination of the machine, elicited our united applause. It is unnecessary for us to give an elaborate description of the engine, which is estimated at 20 horse power.

The power is applied to the saw in the most simple manner by bands; the motion being reduced by increasing the size of the drum, so as to give the saw any required velocity. The saw that we examined made 220 strokes in a minute, sawing three boards from a log twelve feet long, and two feet in diameter, in nine minutes, or cutting at the rate of over 1,150 feet per day, if it could be kept in constant motion—but allowing one half the time to be lost in running the carriage back and adjusting the logs, it would cut from five to six thousand feet of lumber per day. The mill was arranged for two saws, which the workmen assured us they usually kept constantly at work; but the band to one of the rag-wheels having been sent to the shop to be repaired, we witnessed the performance of but one saw. The workmen told us that the power was sufficient for both saws.

The plan for confining the saw without a sawgate, was, as we were informed, invented by Mr. Mooley, and appeared to answer the purpose well.

It is with pleasure that we assure you, sir, that we were highly gratified with the whole performance, and with the utmost confidence, recommend *Avery's Rotary Engine* as a moving power for saw-mills.

Respectfully, your most obedient, &c.

GEORGE MCCORMICK,
J. J. SPEED, Jr.,
HENRY ACKLEY,
HENRY INGERSOLL,

An *engine* of this description, without boilers and machinery, to drive *two* sawgates can be furnished for six hundred dollars—and the boilers, pumps, furnace-irons, and fire bars, governor, and all the *necessary machinery*, up to, and *including* the walking-beam, or drums, for *fifteen* to *seventeen* hundred dollars; or 2,100 to 2,300 dollars for the whole machinery up to the saw; and the same for one saw-gate will be fifteen to sixteen hundred dollars, delivered at the shop of E. Lynds & Son, Syracuse, Onondaga County, or at the "*Novelty Works*," in this city, by application to Mr. Joseph Curtis, 132, Nassau-street.

The power of this engine will be ample to drive one saw in one gate, and three or four in the other—or to drive two saws in the single mill, or mill with one gate.

Since writing the above, we have been furnished with the following statements, from gentlemen who fully understand the subject.

The first is from Henry Seymour, Esq., late—and from commencement of the Erie Canal—one of the acting canal commissioners. Mr. Seymour is himself the owner of a saw-mill of the ordinary kind, and he fully undertands what a saw-mill should do.

The other is from the owners and millers of the new grist mill erected in Cayuga county, New York, in relation to which we recently published a letter from Mr. Avery.

These certificates are from gentlemen who understand the subject, and they may be relied upon.

[*The description of a drawing of the engine, which would be useless without the figure, is omitted. —ED. FAR. REG.

Syracuse, Jan. 31, 1837.

To Elam Lynds, Esq.

Dear Sir—I saw to day the saw-mill in Cicero, which is propelled by one of Avery's Rotary Engines. While I was present, the saw cut a hemlock log of about two feet diameter with ease and rapidity, and appeared to have power sufficient to accomplish much more. The work was well done, and I was well pleased with the power and performance of the engine in all respects.

Yours, very respectfully,
Henry Seymour,

Cato, Cayuga Co., N. Y.
January 25, 1837,

We, the subscribers, owners of the steam grist-mill at this place, do certify that the rotary engine, that drives our mill, is one of Avery's Engines, and manufactured by Messrs. Elam Lynds and Son, and is in our opinion, the best steam power for a grist mill that can be had. It gives us perfect satisfaction, and we cheerfully give this certificate.

The grinding we do is, for customers, in grists of from one to ten bushels, and of all kinds of grain, so that we are unable to say how much we could grind in a given time; but this we can say, that the engine will drive the stones to grind all the grain that any mill can grind with three run of stones, which is the number we have. We have never been able to ascertain the amount of fuel we should require if we were grinding for flouring, or indeed for our present use; but of this we are confident, that, with good wood, we could grind more than 100 bushels with a cord of wood. We do not use the full power of the engine, and it is believed by us and others, that the engine would drive two run more if we had them, and do good business with the five running at once, without any addition to the engine or boiler.

B. Conger.
Henry Furman,

We, the subscribers, millers, tending the above mill, fully agree with the above certificate.

P. D. Livingston,
David Corp.

From the New York Farmer.

POUDRETTE, FRENCH MODE OF PREPARATION—ITS VALUE IN FRANCE, &C., &C.

We are enabled by the politeness of an intelligent French gentleman, to give useful information in relation to the mode of preparation, in Paris, of this valuable manure.

The material, the contents of privies, is taken beyond the limits of the city into a large enclosure, with reservoirs into which the solid part is put, to the depth of 18 to 20 inches, when from *one-tenth* to *one-eighth* in quantity of *dry earth* is mixed with it—and then the mass is left to the influence of solar evaporation. The length of time required to carry it through the process of preparation varies from *one* to *two*, and sometimes even to *three* years—which renders it both tedious and expensive; yet so highly is the article valued by the agricultural community, that the privilege of the *monopoly*, is sold by the city, to the highest bidder, for periods of *nine years each;* and companies are formed, consisting of *intelligent* and *wealthy* men, which *compete for the privilege* of monopoly. The present company pays to the city of Paris *one hundred and thirty thousand dollars*, for the *exclusive* privilege of removing and using the contents of the privies—the company, of course, have the right to charge the proprietors a certain price for the removal.

The estimated value of the article may be readily understood by the prices paid in Paris, and the distance to which it is carried. The price varies from *six* to *eight* francs the *hectolitre*, which is equal to about three and a half cubic feet, or to two and eight-tenths Winchester bushels; which will give about an average of 47 to 50 cents per bushel—and then it is transported from 60 to 100 miles from Paris, and even *exported* to the *West India Islands.*

Chaptal entertained a high opinion of the value of this manure, and speaks of it as follows:—"This pulverulent product is sought for by our agriculturists, who acknowledge its good effects; let us hope, that becoming more enlightened, they will employ the fecal matter itself, as being more rich in nutritive principles, and abounding equally with salts; they can easily govern and moderate the too powerful action of this, by fermentation, or what is better, by mixing with it plaster, earth, and other absorbents, to correct the odor." The suggestions of Chaptal induced a distinguished chemist of Paris, in connexion with a friend of his, to undertake a series of experiments, to ascertain whether *poudrette* could not be made, of *equal quality*, without the necessary delay of *solar* evaporation, as in France, or by *artificial* heat, as in London,—which experiments were, we are satisfied, *altogether successful*—and the coadjutor and friend of that chemist is now in this city, and will undertake the superintendance and management of the *scientific* and *mechanical* department of a company in this city, for its manufacture, as soon as *five thousand dollars more* are subscribed to provide the necessary outfit and buildings.

The general business of the company will be under the superintendance and management of an active business man, who will give information and receive subscriptions at *this office.*

It has been ascertained that from *one thousand five hundred*, to *two thousand* bushels may be made *per day*, in this *city*, from the materials which are *now thrown away*—and that it would be worth from *twelve and a half to twenty-five cents* per bushel. Taking the lowest *quantity* and *price*, it would be worth over *one hundred and eighty dollars* per day, for at least 250 days in the year, the average working time.

Of the *improved* process of preparation, we will say that it is simple when understood. It is completed in from *twelve to forty-eight* hours, by the addition of a preparation, or *compound of vegetable substances*, which disinfects it of, or allays the odor, *without deteriorating* the quality of the manure; aided by machinery which prepares it for use, by dividing it into particles while drying, from the size of *a mustard seed, to that of a hen's egg*—or it may be reduced to a powder and put into barrels, or made into cakes of any size and dried for transportation, and then ground for use.

The *entire* cost of outfit, including *teams*, apparatus, machinery, and buildings, for preparing *fif-*

teen hundred bushels, per day, will be less than fifteen thousand dollars: and six thousand dollars will commence it on the scale of 500 bushels per day. The capital to be entitled to one-third of the profits, which will be *over four per cent a month*—and subscribers to the amount of *five hundred dollars* to have the privilege of using manure at half the market price.

When in successful operation in this city, measures will be taken to give other cities, and large towns, the benefit of so valuable an improvement in city and agricultural economy.

Any information in our possession will be cheerfully communicated, as our desire is to contribute all in our power to the *cause* of agriculture and health.

From the New York Farmer.

URATE, OR MANURE FROM URINE.

We have been furnished with the following translation of a report made in France, on the subject of manure made from urine, or the liquid parts of the contents of sinks.

By this report it will be seen that this kind of manure is exceedingly valuable, and has been used to great advantage—yet it is not held in as high estimation as *poudrette*, or the manure made by *evaporation*, from the more solid parts of the contents of sinks or privies. The value of poudrette is well understood and appreciated in France, Germany and England, where it is extensively used, and even exported to the West India islands with great advantage.

There cannot, we believe, be a question as to its superiority over any other manure, if it is not *deteriorated* by the process of preparation; and so far as we are able to judge from the information in our possession, we have no doubt as to the facility with which it may be prepared without depreciation.

The following extract from the report above referred to, gives many interesting facts in relation to the mode of using, and quantity required, on different soils, &c.

"Eight to nine bushels (or about 600 lbs.,) are generally sufficient per *arpent*—or French acre, which is equal to one acre, one quarter, and two square perches, our measure,—upon artificial meadows, or upon grain after winter has passed, and in dry soils. In poor soils, it is necessary to increase the quantity from 12½ to 17 bushels per *arpent*, or from 10 to 13 bushels to the acre our measure, when used on grain in the fall. In damp soils it has been used with success, at the rate of from 17 to 21 bushels for winter grain. On the fertile soils of La Beauce, it has been used with more success than plaster upon artificial meadows, and only at the rate of 13 bushels per arpent. In the vallies of Labrie from 17 to 21 bushels, and at Montereau and de Bray from 8 to 10 bushels per arpent are used. This manure may be dissolved in water, as its action is greater when it rains, soon after it has been spread. The time for using it is indicated by the nature of the soil and mode of culture. Upon such soils as do not retain water, it is better to spread it at the time of sowing. The moisture of the earth, and the rains of that season, hasten its solution, and the grain is better prepared to resist the effects of the winter. Nevertheless, if the sowing takes place a very short time previous to the setting in of the hard frosts, it would be better to omit spreading the manure until early in the spring.—Grain treated in this way has given a produce very superior to that treated in a different manner; also, when the soil retains water during the winter, it is better to delay spreading the manure until spring, as without this precaution it would be too much diluted, except upon early sowing. In a wet season, more manure is required to be used in autumn, than in spring, upon the same quality of ground. The use of this manure is very profitable upon spring wheat, and other spring crops, if care is taken to spread it in damp or rainy weather.

When spread immediately after a heavy rain, its effects are almost instantaneous. During two years trial, its effects have been highly satisfactory. The following are the results:

The crops have been rendered stronger, and heavier by its use, and come earlier to maturity, while the grain has been larger and better filled.

Oats have yielded double, and the grain very heavy.

The same results have been obtained with barley.

Buckwheat has produced two or three times its ordinary crop.

Potatoes have yielded twice as many tubers, which are much larger than usual, very mealy, and of exquisite flavor. The manure is applied by being mixed with pulverized soil and put in the hill.

Turnips have been able, after its application, to resist the attack of the *tiquet*, (an insect) which eats the first leaves of the turnip during the drought.

Beet roots obtained a circumference of 28 inches, were of a superior quality, and the leaves of unusual size. Upon the vine the trials have likewise been very successful, the vegetation has been more active and the period of ripening advanced a fortnight, while the wine was of better quality than that from the same sort of vine on the same ground, but which had not been thus manured.

For the culture of the vine, three differet modes of manuring have been tried, viz: Spreading it as in a cornfield, placing it at the foot of the vine, or by dissolving it in water, in the proportion of one pound to a gallon. This last mode has been found most successful. It has also been preferred to the other methods both for vegetables and fruit trees.

A great advantage of this manure is, that it does not, like most other manures, propagate weeds, as it is entirely free from seeds; and that it acts for two years at least upon the same ground without renewal. For grass and clover, it is superior to plaster, as it has never been found injurious to sheep and cattle."

From the New York Farmer.

EXTRACT FROM AN AGRICULTURAL TOUR IN WESTERN NEW YORK.

Tonawanda is a small stream flowing into the River Niagara about twelve miles above the Falls. It is dammed at its mouth, and is used for several miles as part of the Erie Canal. A con-

siderable village is growing up at the mouth of the river, nearly opposite to Whitehaven on Grand Island; and the timber from Grand Island, destined for the New York and Boston shipyards is here admitted into the grand canal. The railroads between Buffalo and Niagara Falls passes through the village; and in future, passengers in the canal packets will probably disembark here and take the cars to Buffalo, by which means a distance, which, by water, occupies about three hours, will be passed over in less than an hour, three quarters of an hour will ordinarily be deemed sufficient; a great and most valuable gain to travellers. The river Niagara, at the entrance of the Tonawanda into it, presents deep water and a secure anchorage for large vessels, which may be employed in navigating the lakes; but the difficulty of reaching the lake against a strong current and some difficult rapids, excepting under peculiarly favorable winds or very strong power of steam, may be thought to present strong obstacles to its use and improvement as a port of shipment. These, however, will be easily overcome by steam power, and availing of the ship canal at Black Rock. This and Whitehaven, must, from the facility of procuring the best of timber in the immediate vicinity, offer a most favorable situation for the building of vessels. The village is destined to extraordinary prosperity from its advantageous situation and the great improvements now in progress. The land in the vicinity of Tonawanda is of an excellent description. As far as the backwater of the creek extends, a distance of three or four miles, this circumstance is prejudicial; the cultivation in some places being necessarily hindered, and the general healthiness of the country has been supposed to be affected. The latter circumstance, however, is becoming obviated by clearance and cultivation. But, when the land is not so affected, the soil is eminently favorable to wheat, oats, potatoes and grass. Indian corn is sometimes cultivated with success, but it cannot be considered a safe crop. The soil is improved by cultivation. The whole country is of calcareous formation: loam resting upon limestone and intermixed with limestone gravel, which, in the form of a carbonate, is seen intermixed abundantly with the soil in small grains. These being brought to the air by the plough, become decomposed; and the soil in this way acquires constantly increased blackness and fertility. Peas are a favorite and very productive crop. On visiting one of the best farms in the neighborhood of the creek, the farmer informed me that his crop of wheat usually averaged from twenty-five to thirty bushels per acre; of peas, thirty bushels; of grass, one and a half to two tons per acre. He uses no manure for his land, excepting that he has spread some on his grass land; and he showed me a field which, with the exception of three intermediate years, had been in wheat thirteen years without a diminution of the crop.—I have perfect confidence in the honor of the gentleman who made these statements, but possibly there may be some little unintentional overstatement; as it almost always happens, where crops are not matter of exact measurement, but of estimate or conjecture merely, there is a tendency to overstate. A crop of wheat certainly, without very careful cultivation, averaging from twenty-five to thirty bushels is quite large. The aftermath in the fields was short; and by no means a fair test of what the land is capable of being made to do. The farming in most parts of this country was inferior and slovenly; and the regular introduction of clover, with all the grain crops and the ploughing it in, would produce a most favorable and extraordinary change in their condition. Speculation, however, is so rife, other means of procuring money seem to promise so much quicker returns; and labor is indeed so difficult to be procured, withal so expensive and troublesome, that mere cultivation, it is to be feared, will continue to be regarded as a secondary interest. The passage of the canal through this country, and the multitude of canal boats which seem to pass and repass in an almost uninterrupted succession, afford a ready and cash market for all the produce of their farms. Their wants, even then, are but imperfectly supplied. The growth of the country here is in many places magnificent—oak, black-walnut, maple, whitewood and elm, of the largest description. Most of the wood, which is cut here, is sent to Buffalo, or sold at the steam saw mill on Grand Island.—Much of that which is suitable for timber is sawed at the same establishment for this purpose.

The ride from Black Rock to the Niagara Falls, by the side of the Niagara river, is extremely beautiful; the expanse of water, the several fine islands skirted with rich foliage to the water's edge; and the excitement of an approach to the falls, which it is not easy to suppress, though you may have visited them repeatedly, render this jaunt exceedingly interesting and delightful. The ride for some miles below the falls towards Lake Ontario increases in picturesque effect; and presents many points of view embracing the falls themselves, the wonderful passage of this torrent through its walls of natural masonry, which it would seem, must have occupied centuries, not to erect, but to excavate and widen, the compression of the torrent before it branches into the whirlpool, where owing to the narrowness of the passage, and the velocity with which it is forced onward, the central ridge of waters like the roof of a barn is elevated at least ten feet above the edge of the waters at the shore; the whirlpool itself, and afterwards the whole course of the river until it enters into Lake Ontario, which is seen distinctly from the high grounds, and lastly the magnificent and glittering expanse of the lake itself, present a succession of views unrivalled and enchanting.

The land on the shores of the Niagara river, from Tonawanda to a distance of three miles below the falls, as far as my ride extended, is similar to what I have already described, excepting that in some places the clayey portions predominate much more here than in others. A good deal of this land has been a long time cleared and the stumps removed. It is much of it of a very fine character for wheat. A highly intelligent gentleman of the village, at the falls, who accompanied me, showed me a field, which with the exception of one year, had been for thirty years in succession in wheat, without manure, and without any apparent diminution of its fertility.—Twenty to twenty-five bushels of wheat are considered an average yield; thirty are often obtained. The first ploughing is generally shallow; afterwards deeper ploughing improves the soil. Plas-

ter and clover have not yet been tried. Improvements are in progress, and a spirit of enterprise awakened, united with intelligence, from which the best effects will result; and which must soon put a different aspect on the whole face of this splendid country; for which in respect to picturesque scenery, nature has lavished her gifts in prodigal and almost unrivalled profusion.

Opposite Tonawanda, and lying along in the river for a distance of about nine miles, is Grand Island, a magnificent tract of land of an average width of four miles, and containing about eighteen thousand acres. The northern extremity is in sight of the rapids of the great falls, though steam vessels and others cross far below it from the American side to Chippewa on the Canada shore. A small portion of the island is at present cleared; and the remainder is covered with a noble growth of the most valuble white oak timber, black walnut, and other wood. The surface of the island presents few inequalities, and the highest point is but a few feet above the river, in the middle of which it is situated, and which furnishes deep and excellent ship channels on either side. The soil is excellent, where it has been brought into cultivation; some of it being alluvial, and the rest a rich loam with an intermixture in greater or less measure of clay; suitable for wheat, oats, grass, and succulent vegetables; and if the beet cultivation for sugar, should be pursued to any extent, eminently adapted to that product. It is, likewise, extremely well suited for dairying and grazing. The land hitherto being held in common, and the objects of the company being mainly the getting of ship timber to market, small attention has been given to agricultural operations and improvements. I was much gratified here in looking at the barn above 100 feet in length erected by Lewis F. Allen, Esq., near the village of Whitehaven, for the keeping of the numerous ox-teams employed in the saw mill at that establishment. The barn is entered lengthwise, and the great floor extends through the whole. The mows for hay are on each side of the floor; and lean-tos or close sheds are projected from each side of the barn for the whole length, which furnish stables for the cattle. The whole is well contrived, considering the flat situation in which it stands; and the teams, and every thing connected with the establishment, in excellent and farmer-like condition. I shall forbear a more particular account of it, as I hope at a future time to receive it from Mr. Allen's own pen.

H. C.

From the Cultivator.

CELLARS.

It is a practice in Germany, worthy of our imitation to keep open a communication between the cellars and principal chimney of the house, to enable the noxious air, more or or less generated there, to escape. It also promotes the draft of the chimney. The air in cellars often becomes highly deleterious to health, and the sickness of families may frequently be traced to the stagnant and noisome air in these underground apartments. Where there are different apartments in a cellar, ventilation should be provided for, by leaving a passage open over the doors of communication.

HABITS OF THE SALMON.

A very singular and inexplicable instinct has been ascribed to the salmon, but which has been doubted and disputed by many, even of those who have turned their attention to the subject. The fact to which we allude is, the propensity of salmon to return from the sea to the identical rivers wherein they were spawned. This has now been established beyond the possibility of doubt. In the report of our townsman, Mr. Robert Buist, superintendent of the river Tay, under the act for the protection of the breed of salmon, given in to the meeting of heritors in October last, he noticed a curious experiment made last breeding season in certain small fishing rivers in Sutherlandshire. These rivers disembogue themselves into Loch Shin, and no salmon were ever known to have existed in their waters before; but as they seemed to be well adapted for breeding this species of fish, the Duke of Sutherland, the proprietor of these rivers, resolved to have them *planted* with salmon. Accordingly several pair were carried from other rivers to which they were indigenous, and placed in these during the breeding season, and there they deposited their spawn. The result was awaited for with considerable interest as calculated to set at rest the disputed question. It appears by a letter, Mr. Buist has just received from his correspondent there, that the experiment has been successful. The subject is, no doubt, of great interest to those concerned with the fisheries, and those who are curious in this department of natural history. The letter states: "Our last year's *planting* of salmon has returned to the same rivers this year. In the commencement of close time we carried salmon to one of the rivers where we put them last year, and left two of these rivers without putting any into them to ascertain whether these salmon did or did not return to the rivers where they were spawned; and, at the usual time of spawning, we found a few pair in each of these rivers, where never a salmon was seen before the fish we put into them last year; so that we can have no doubt of every river having its own breed of salmon, and that they will return to their own rivers unless interrupted on the passage, or encouraged into other rivers by an unusual quantity of water. I never believed in this doctrine until I had the experience of it from the different sizes we have of the many rivers in the north. I have studied all this with great care, and I may say now, I am a complete disciple to these habits of the salmon."—*Perth Constitutional.*

From the Genesee Farmer.

THE WIRE WORM.

Of all the insects that prey on the labors of the husbandman, there are few that make more serious inroads on his prosperity, or contribute more effectually to lessen his profits, than the one whose name is placed at the head of this article. The wire worm is the larvæ of a species of the genus *elater*, of linnæus; a class of insects known by the familiar name of snapping bugs, so called from the power they possess of throwing themselves into the air when placed on their backs, and thus regaining their feet, which on a smooth surface they would otherwise be unable to do.

The bugs occur on flowers, on various plants, and on the grasses; and deposite their eggs near the roots of plants, where they find their way readily into the ground, and there remain in the larvæ state for a longer or shorter time according to the species, preying on the roots of such plants as constitute their food. It is in this state that they do the mischief which renders them such a pest to the farmer. The *elater* appears partial to grass lands, and hence such are the most infested by the larvæ. It is on newly turned pasture or meadow land, that crops of corn or grain are the most liable to suffer.

According to Wilson, the name of *wire worm*, bestowed on the larvæ of several species of elaters, is more specifically applicable to that of the *calaphagus lineatus* of Stephens. Its habits have been carefully examined by Mr. Bierkander of Sweden, who calls it the root worm. "The body is very narrow, of a yellow color, hard, smooth and shining, and composed of twelve segments, on the last of which are two indented dark colored specks. The head is brown, the extremity of the jaws black. It is said to remain five years in the larvæ state, from which it issues as an elater, the *E. segetis* of Bierkander, synonymous with the *E. lineatus* of Linnesus, and the insect above named of Stephens." The anterior segments have six feet, and with the aid of these and its scaly head, it burrows in the ground with great rapidity.

Great damage is often occasioned by the wire worm to the turnip crops in England, farmers being sometimes compelled to sow their land as many as two or three times, the first plants being entirely devoured. "In the year 1813, according to Mr. Spence, this larvæ destroyed the greater proportion of the annuals sown in the botanic garden of Hull. In such cases, Sir Joseph Banks recommended that pieces of potatoes, stuck on sharpened sticks, should be placed in the ground near the seeds, and examined and cleared of the wire worms that would adhere to and feed upon them from time to time." The lavæ of the *E. striatus* attacks the roots of wheat, and like those of the other species where they abound, are in some seasons productive of immense danger to the farmer.

In this country, the only one known to produce serious injury, is the larvæ of the *E. lineatus*, and the damage has hitherto been principally confined to corn, a crop scarcely known in England, and of course never taken into account when speaking of the insect. As the culture of the roots extend, its depredations in that way may attract attention, but now it is hardly known, except in connexion with grass or corn, and here it is frequently terribly destructive. In dry seasons we have seen large portions of pastures or meadow land, the turf of which loosened by the roots, being entirely cut off, might be rolled up like a carpet, in pieces of any required size, and the numbers of the worm collected in such places, was such as to defy calculation. Corn it attacks as soon as it is put into the ground, or begins to swell and sprout, and rarely leaves a plant till it dies, when it shifts to a new and fresh one. A friend of ours last year turned over a piece of meadow land, rolled it smooth, and planted it with corn. It was soon assailed by the worm, and in a few days plats of several rods square were entirely destroyed; while the whole piece was more or less injured. In some of the hills of corn, as many as twenty or twenty-five worms could be found at once, preying on the roots, penetrating the stalk below the surface of the ground, and thus, in both ways, rapidly exhausting the vital juices. As the ground was very rich, and the small quantity that grew the last year would have had no effect in exhausting the soil, after receiving a thorough ploughing, the land has been again planted, but present appearances indicate no better success than before. The hills are already full of worms, and, in many instances, examination shows that each root or shoot as fast as they appear, are totally demolished.

The wire worm is the most difficult to destroy of any insect the farmer is called to encounter.—Deep in the earth among the roots on which he preys, carefully avoiding all approach to the surface, or exposure to the light, possessing the power of moving with the necessary rapidity in the loosened soil, he is rarely noticed, or his presence detected, except by the ravages he commits. The cut worm, with which the wire worm is by some confounded, is sometimes very destructive, but his operations are carried on above ground, and he is easily detected and despatched. Clumsy in his movements, and penetrating the earth with difficulty, the cut worm is very unlike the smooth wire worm, which, when brought to the surface, again buries himself almost instantly. The cut worm undergoes his transformation, it is believed, within the year; the wire worm continues in his destructive state for four or five years. Various applications have been recommended to destroy or drive away this voracious depredator; but little reliance can be placed on any we have seen tried, that would not destroy the plants also. For ourselves, we should place the most dependence on ploughing, late in the fall, the land intended to be cultivated the ensuing year. After the wire worm has committed his summer's eating, as the cold weather comes on, he becomes torpid, and remains in this state till spring. If while in this state, he is thrown out of the ground, where he is exposed to the severe frosts and vicissitudes of the season, he must perish; and this exposure is more surely effected by ploughing late in the fall than in any other way.

UTILITY OF LIME IN PRESERVING FENCE POSTS.

Accident in some instances, has led to the discovery that lime, applied to wood, preserves it from decay. The whitewashing of fences is practised, more as a substitute for paint, and for appearance sake, than to prevent decay. Even this superficial mode of applying lime, is of some use in preserving wood. Having full confidence in the efficacy of lime, as a preservation of wood, to make fence posts less subject to rot, I have this season, for the first time, used it as follows: I provided a number of narrow boards, about three feet long of various breadths, and one inch thick, with a hole in the end of each. When the hole in the ground was ready for the reception of the post, some lime was put into it; on this lime the post was placed; some of the narrow boards were then selected and placed to and around the post in the hole. The ground was then rammed into the

hole after the usual manner; and, when filled, the boards were drawn out. This is done with greater facility, by putting a stick into the hole in the upper end of the board, by which it may be raised by a lever or prise, if too fast to draw out otherwise. The boards being all removed, fill the space they occupied with quick lime: if but partially, it is better than if totally slaked, because as it slakes it will expand and make the posts stand very firm. If altogether slaked, it also swells and makes the post quite secure. From three to five posts with hewn or uniform butts will require one bushel of lime. Boards to surround the post half an inch thick (and perhaps this thickness of lime may be sufficient) would not take half that quantity. The lime is all the additional expense, except the extra labor, (which is very trifling,) to be incurred by setting a fence, with that part of the posts in the ground enveloped in lime.

To prevent the ground from adhering to the posts at the surface, and occasioning their decay, this part being the one which generally first begins to rot, lime mortar is applied, plastering round the posts with an elevation adjoining to the wood. Into this mortar, gravel was pressed to prevent the rains from washing it away. This mortar may be applied at any time most convenient after the fence is made.—*Memoirs of Philadelphia Society.*

For the Farmers' Register.

REMARKS SUGGESTED BY A VISIT TO WARREN COUNTY.

By the Editor.

Warren county, in North Carolina, is in the same geological range with the upper parts of Dinwiddie and Henrico, in Virginia, and other lands lying over the belt of granite which forms the falls of all the rivers. The granite belt south of the Roanoke, however, seems much broader than in Virginia, and the surface of the earth to furnish soils of very different and superior quality to the more northern granite lands above referred to, in Virginia. The falls of the Roanoke, extend as far down as Weldon, fifteen miles below Gaston, which of course fixes the southern visible limit of the granite belt, and it is traced in the cutting of the railway, and elsewhere along its course, for more than thirty-five miles above Gaston. The railway, now constructing, passes along the ridge which separates the Roanoke and the Tar rivers, with no considerable deviation from the summit of the ridge, except where the road crosses these two rivers. Though, as usual in our country, the ridge is very level, and therefore furnishes an excellent railway route, the surface of the county of Warren is generally broken, and the land hilly, except on the summits of the ridges, where it is invariably poor. The sloping and hilly lands lying on the small streams, (very improperly, throughout all the United States, called *creeks*,) furnish all the good high lands of Warren; and there is a very large proportion of good quality, though none is very rich. The texture is of various degrees, from light loam to stiff clay—the former, and that which approaches to it, being designated as the "gray" and the latter as "red land." The red lands embrace all the richest and best soils, and nearly or quite all the poor and level ridges are gray.

If it were not that the fact is so general, and so notorious, that it attracts no observation, it would be a subject of curiosity and wonder, that the soil of level ridges should be poor, while the lands sloping from them, hilly and exposed to washing rains as they may be, are superior in fertility, and sometimes even very rich, when the neighboring ridges are very poor. M. Puvis, when treating of similar soils in France, (in his article on "argilo-silicious" soils, given at length in vol. iv. of Farmers' Register,) supposes that the last geological change was the covering, by some great flood, of the whole surface of the country, by a thick deposite of the earth which now forms the soil of the ridges—which earth is what he designates as the "argilo-silicious," and which is precisely what was described in the *Essay on Calcareous Manures* as the "*acid ridge lands*" of lower Virginia. According to M. Puvis' theory, after the whole country had been buried under this uniform and deep cover of barren earth, other great floods, aiding the slow operation of the streams which still flow, cut down and washed away the earth, so as to expose the present surfaces of the slopes, and reach the more fertile earth below. But however plausible this view may appear to speculative geologists, it will not pass with farmers, or other practical investigators. If this poor surface earth had been thus super-imposed, the different varieties, and richer strata which now present their edges to form the hilly slopes, would still lie horizontally below the ridges, and would be reached and identified in digging wells, and even exposed by the washing away of the thinner portions, at the edges of the barren cover. No such thing has ever been heard of; and poor as the surface soil of a ridge is, no one expects to find richer *soil* (though mineral *manures* may exist,) at any depth below.

My short visit to Warren was induced by private and personal objects, which permitted no other than incidental and chance-directed, as well as very hasty views of the soils and of the agriculture of the county—and of course such observations are worth very little. Even if there had been an intention of making any thing deserving the name of agricultural observations, and time and leisure could have been afforded for that purpose, I should have been deterred from making the attempt, by the general and unvarying statement made, in answer to my questions, that there was no improvement or even preservation of existing fertility made, or even attempted by any cultivator; and that the whole system of agriculture consisted in clearing as much forest land, every winter, as possible, getting out of it as many and as heavy crops as possible, (and all exhausting crops,) and when worn down to sterility, sooner or later, to "turn it out" waste, until somewhat restored, after many years, by the improving operations of nature—the sole improver of land in this region. This is the earliest mode of cultivation in almost every country—and therefore it would be idle to look for exceptions, here or elsewhere. But when such wide-spread, obvious, and deplorable examples of the effects of this system are exhibited in the similar and not remote lands in Virginia, it might be supposed that the intelligent planters of Warren would see the expediency and the profit of securing and preserving the natural fertility of

their lands, of which, they have, as yet, wasted and destroyed but a small proportion. It would be both very easy, and very profitable, to effect this object, if commenced now; but if the effort is delayed as long as is expected, the lands of Warren will be reduced to the same hopeless state of impoverishment as has been produced by the like course on much land north of the Roanoke and other parts of the like hilly region of Virginia, in the same range above the falls. *Hopeless*, because the naturally rich soil, which, if left, could have recovered, will be washed away, and no calcareous manures can be obtained to aid in reviving these, or to fertilize the naturally poor soils. Warren county now has a large proportion of productive soil, and much that is very valuable; but let these be as much worn and washed as the continuation of the present cultivation will certainly effect, and there will be no agricultural region more worthless, or of which the profitable resuscitation will be more desperate.

The present productiveness of the Warren lands, and the great returns which have been derived from even their heretofore wasteful and impoverishing cultivation, is sufficiently proved by the amount of annual income, and of accumulated wealth, of all the cultivators who have pursued well (that is with industry and economy,) their very bad system; and of the whole number, the proportion is very large of thriving and wealthy men.

It was stated above, that the rocks of Warren are of the same kind as are found in the narrow strip of country in Virginia which lies over and immediately above the falls—and that the face of the country, in form and unevenness, was like a higher range of lands, as in Brunswick. Amelia, &c. But I should infer, that in the texture and character of the soil, the lands of Warren were more like those of a still higher range, such as are presented in Charlotte county in Virginia. The appearance of the deep red clay sub-soil, and its known improvable nature, where lying under the best soils in Warren, seemed to indicate its general resemblance to the fine soils of Wardsfork in Charlotte, and on James river in Goochland, both of which somewhat approach the peculiar characteristics of the noble soil of the South-west Mountains. I have long been satisfied that the peculiar value of the latter lands, and their fitness to be improved by clover and gypsum, is caused by their having a large (though still not sufficient) natural proportion of lime. No one has thought of trying clover and gypsum in Warren; but I incline to believe that they would operate well on the best soils, (as the slopes of Great and Little Fishing creeks,) and if so, there would be found new and immense resources of fertility and profit. But without resorting to these aids, and by merely using putrescent manures, and avoiding the most exhausting tillage, it would be easy to preserve the present productive condition of the Warren lands.

There are scarcely any pine trees in the natural forests, and none at all on the good red soils. Oaks of different kinds form the principal growth, and next to oaks, hickory seemed most abundant on the better soils. I saw but little of the latter kind of land—and on that, no growth that elsewhere indicates very great fertility, or calcareous, or otherwise very fine soils—as pawpaw, walnut, locust, hackberry, &c. Much of the surface is strewed with small rocks, (not rounded,) the kinds of which have an evident relation to the qualities of the soils; and an observer who united a knowledge of mineralogy and geology with that of the agricultural qualities of soils, might, in this respect, make important and highly useful discoveries. I greatly regret that I cannot bring any such knowledge to bear on agricultural investigations—though even to my ignorance, it is evident that great would be the public gain if we had any well informed, observing and communicative farmers, who understood how to apply to agriculture the truths of chemistry, mineralogy, and geology; or, if our chemists and geologists had any thing of, and did not slight in their investigations, and treat with disdain, the proper knowledge of agriculture.

The stones are rarely thick enough to require being removed, or to be put into heaps, to be out of the way of tillage; and their presence is considered desirable on the hilly lands, as serving partially to prevent the washing away of the soil. I infer that it is not the existing stones which have this effect, mechanically, but that the soil, formed by the former disintegration of such stones, resists washing. The stone found on the ridges is quartz, (or "flint rock,") white, or dull yellow, and inclining to brown, according to its greater or less degree of purity—and the whitest and purest indicates the poorest soil. On the richest soils of the slopes there are other kinds of stone. The first is principally aluminous, of a dull yellowish brown color, when newly broken, and the fracture as rough as that of a half burned brick. The gravel, which is very abundant over this land, is mostly formed by the former disintegration of this comparatively soft rock. On the best soils of the slopes, besides this rock, there is another kind, or perhaps two others, the black and blue, both very hard, heavy, and evidently containing much iron. The fracture is smooth; the interior color is different shades of slate color, and sometimes purple. In some, it has a blackish ground, filled as thickly as possible with minute specks of white. The deeper cuts made for the railway (along the ridge) exhibit throughout what seems as the mouldering skeleton of an ancient rock formation. To the eye the appearance is that of rock, as shown in the regular structure of its layers and veins, and position of the materials; to the touch, it is but earth, and crumbles into a mixture of clay, fine sand, and coarse gravel, all of which are seen separate, though close adjacent, before the removal. The colors are also as different, and distinctly separated, as are the qualities which affect texture. Parts of the rock form a perfectly white earth, some yellowish or pale red, and some a deep red inclining to purple. The present exposure would present an interesting study for a geologist—and yet I doubt whether the farmer could learn any thing from the report of a geologist on the rocks of this region, except perhaps that "here is granite—here grauwacke—and there lies micaceous slate;" from which we are able to learn as little from the men of science, as they will stoop to acquire of our more humble practical knowledge. The world has as yet derived almost nothing of the immense, inestimable benefits, which are to be found, and might be attained by proper instruction, in the combined application of science and agriculture. All the most important principles in agriculture rest on the truths established by, or derivable from, chem-

istry, mineralogy and geology—and yet no man of science has discovered and announced a single important improvement in agriculture, whilst by false deductious they have countenanced many great and dangerous errors. The importance of such a connexion and combination of knowledge is too little considered, even by the few who have thought of it at all. The important discovery of vertical draining, chance-made by the ignorant farmer Elkington, was easily deducible from a knowledge of geology and of hydrostatics. All the original and useful discoveries in regard to the nature and management of soils and manures ought to have been made still earlier by chemists; yet for not one are we indebted to the learned. And as drainers ought to derive aid from geology, and cultivators from chemistry, so men of science sometimes might profit by the aid of ignorant though practical men. Of this truth, an illustration is close at hand. On the Greensville and Roanoke railway a deep cut struck a vein of water passing through quicksand—and the continual caving in of the earth deferred the completion of the work for months, and caused an increased expenditure of thousands of dollars. The source of this water had been previously reached by a well dug by a contractor at the highest point of elevation, and the hydrostatic pressure was even there so great as to cause the water to rise almost to the top of the well. If the inclination and direction of the strata were such as to permit the operation, a ditcher, possessed of Elkington's practical knowledge, would have known at once where to tap this spring, at some other point, perhaps a mile from the railway, and have drawn away the water by a lower and preferable outlet, and at a very small expense. As soon as the vent was opened by the railway excavation, the water in the well sunk, and the supply to the well was either nearly or quite lost.

The larger crops cultivated in Warren, are corn and oats for home consumption, a little wheat for market, and on the best lands, tobacco generally in the upper, and cotton in the lower half of the county. The length of the land carriage to market (Petersburg) has heretofore kept down the production of wheat; but the Raleigh and Gaston railway will afford sufficient facility and cheapness of carriage to make this, what its soil fits it to be, a very fine wheat country.

There is nothing worth the name of a *rotation of crops*—unless such should be called the continued succession of some of the above five crops, chosen each year merely according to views of present profit, and kept up as long as the land is thought worth tilling—say from ten years on the poorer, to fifty or more on the best lands. If, before the final exhaustion and "turning out" there is at any time a single year of rest afforded to a field, (and that is no *rest* from grazing the scanty cover of grass that may grow,) it is not by design, nor for the purpose of improvement, but because the annual clearings of the farmer have a little outstripped his annual wearing-out of soil, and that therefore he has more land worth the labor of tillage than he has hands to work. However, such short resting times rarely occur, and scarcely affect the general system. The little manure that is made is given entirely to the tobacco and cotton fields. No grass crop is sown, and none reaped, except on a very small proportion of natural wet meadow ground.

The exhausted lands, when turned out, though bearing no pines among their former virgin growth, produce them in preference to other large second growth of trees. Still however pines spring very slowly and thinly—and scarcely begin to cover what had once been good lands, until after thirty or forty years. Briers and sumach bushes precede the pines; and all do not prevent, for many years after the cessation of tillage, the growth of sweet and nourishing grass, which though a very scanty crop for the great extent of surface, furnishes an abundant supply of early summer food for the cattle. The cattle seen on the old fields on Mr. B———'s land on Great Fishing creek, (where I made most of my observations,) were remarkably fat, (on the 7th of July)—and I understood that the first month of grass was generally enough to make them fat. Yet the cattle must be badly prepared by the severe sufferings of the previous winter for speedy fattening. Mr. B. stated that the wintering of their cattle was generally very badly effected, that all suffered greatly before the spring, and that a large proportion on most farms died—and that he himself calculated on losing five or six, on an average, out of his small number of stock every winter. I infer that it would be a far more profitable course to sell (or consume) as beef, in summer, when they are very fat, at least as many as the average number expected to die of poverty and lice during the next winter. I cannot pretend to point out the precise causes of these losses in cattle; but there can be no question but that it is from management as bad for the cattle as the system of cropping is for the land. This must be a very excellent grazing country; and if proper sustenance and care are afforded for winter keeping, and proper markets are opened, at home or abroad, cattle and sheep will be here a more profitable object for the farmer's care, than any of the now staple crops.

Judging from the report of others, and from my own slight personal observation of his property, I infer that my friend Mr. B. is a successful and profitable cultivator, upon this very bad general system of cultivation. But he altogether disclaims any pretension to the character of a *farmer*—and for my part, I certainly cannot consider any one as a good farmer, who does not increase his capital of fertility, by improving the soil, as well as obtain sufficient annual returns from his tillage. According to this definition, then, whilst there are very many industrious and money-making cultivators in Warren, there is not one good farmer.

The Raleigh and Gaston railway will be completed from the Roanoke as far as Chalk Level, about forty-five miles, by next July, thus affording to all Warren and part of Granville county, railway transportation to Petersburg. This valuable public work will add greatly to the nett profits of agriculture, and of course to the value of lands, and the wealth of the proprietors in this region. But notwithstanding, the importance of this public improvement has not yet been duly appreciated and adequately supported by the many wealthy people of the neighboring country. It is viewed by most persons simply as an interest-paying fund, and valued merely according to the dividends, or money profit, expected. It is true that this is all that foreign or distant subscribers can look to; and the very liberal subscriptions made, without the borders of North Carolina, show the high estimate

that has been made of this part of the value. But to all who will send their crops to market by the railway, or who possess lands that will be increased in value and price by the new facility afforded, there are inducements offered to sustain the work, still more important. It is true that these profits cannot be apportioned according to the respective amount of subscriptions, but will be shared by all, whether contributing to aid the work or not. But that very condition should give force to the moral obligation on all who are to be manifestly benefited, to afford aid—and that they should not remain indebted to the contributions or alms of others, for profit and wealth to themselves.

The forest growth of Warren is generally beautiful—being principally of oaks, which surpass all other trees in beauty and magnificence. In many parts there is very little under-growth, and the trees, and the whole ground as left by nature, form a scene as beautiful as any grove or pleasure grounds planted or nursed by man, and far more gratifying to my view than any such product of art. The little village of Warrenton owes its great and peculiar beauty to having been built in an oak forest, and many of the trees having been left, and of course as irregular in position as nature would fix, and correct taste would desire them to be. A few acres of the fine oaks in some parts of Warrenton, for beauty and grandeur, are worth all the aspens, balm-of-gileads, lombardy-poplars and other exotics planted in straight lines and at right angles, in the Capitol Square in Richmond. I heartily wish that the trees of our Capitol Square and their tasteless superintendents, whoever they are, were both rooted out effectually. The bad taste exercised in the planting of that beautiful location, was as great, as the total ignorance of the qualities of soils and manures displayed in the means used to enrich the ground.

The village of Warrenton is three miles distant, by a nearly level cross ridge route, from the Raleigh and Gaston rail road. I was informed by the engineer who has in charge that division of the road that a lateral railway from Warrenton might be constructed and used so cheaply, that it is surprising that it has not been undertaken by those interested in the trade and prosperity of Warrenton. The existing trade of that place is merely of import—of commodities brought to be sold by retail to the neighboring people. Of course all the heavy transportation is towards Warrenton—and to facilitate that alone, and to avoid any change of loading between Petersburg and Warrenton, would be an important object. But this is not half the business that might be expected for this little railway. It would make Warrenton, what it never has yet been, or aspired to, a place of deposite and sale for country produce, and of the export trade to larger towns. This will follow of course, (if the present trade is retained) when the transportation from Warrenton is made almost as easy and as cheap as if it was altogether on the main road. All the people of the neighboring country buy their manufactured goods and groceries in Warrenton, and a vast amount of money is in that manner annually expended in that place. Now if the merchants would buy, as well as sell, and could give the Petersburg and Norfolk prices, with the mere deduction of the cost of transportation to market, (and surely they could afford this to all who bought of them,) then the convenience and interest of the farmers would concur in making that a place of sale, as much as now a place for their purchases—and the one kind of trade would offer additional inducements for the other, so as greatly to increase both, and the whole trade of all kinds.

The great improvement made by substituting canals for mill-ponds is extending in the counties of Halifax and Warren. I was told of several recent changes of the kind, which had worked admirably. By one, a pond of three hundred acres has been changed to valuable arable land. In another case, Mr. W. W. Thorne, of Halifax county, owned a mill, the pond of which was deemed so injurious to the health of his neighbors, that they offered him twelve hundred dollars to cut the dam. He made a canal which is only six feet wide, and which, as yet, takes in only the smaller of two streams, which before supplied his pond: and notwithstanding, besides the pecuniary payment, and his share of land covered by the large pond, he has gained a considerable increase of water power—while his neighbors have gained the far greater benefit of relief from sickness.

It seems, that though the mill law of North Carolina is much the same as that of Virginia, that in practice its operation is not so enormously unjust and injurious; because, for the erection of every new mill, it is necessary for the proprietor to establish clearly that a mill is there wanting for the public convenience, before he can put it up. It is therefore that Warren is yet generally healthy, instead of being like Brunswick, or as it would have been, if situated in Virginia. The general practice under the law in Virginia, is for juries to assess very small damages for the land actually overflowed, none for any land otherwise damaged by the accumulation or discharge of water—not a cent for the chance of poisoning a neighborhood by the production of malaria—and withal, to grant this power of destruction, not because the public interest strongly requires a new mill—nor even because individual interest requires it—but often because the whim, or the ignorance, or even the spirit of rivalry and malice in an individual, prompts him to build up another mill in a neighborhood, where there were, before, more than enough for all useful purposes. The only effectual opposition has generally been found to be that of the owner of an older mill, who dreaded the opposition of a new one; and their neighbors, who were to suffer disease or death from the new poisoning establishment, have generally acted as if they had no interest whatever in the question. Yet if we could bring back the money (and money's worth of time and labor,) paid and lost by the sickness, and prostration of vigor, caused by the effluvia of mill ponds—and the population destroyed, or driven abroad to the west, by the same cause—Virginia would be made at once comparatively a rich and populous country.

From the Cultivator.

MULLEIN A SAFEGUARD AGAINST MICE.

The common Mullein, *(Verbascum,)* Harkhermer informs us, after being properly cleared of the adhearing earth and other impurities, is extensively used in German graneries, roots, stocks and flowers, in order to prevent the depredations of mice, and that it affords a complete protection against these vermin. Bundles of it are placed in

every corner, and on the grain itself. The mice will suddenly disappear from barnes where it is placed.

From the Courier and Enquirer.

IMPORT OF FOREIGN WHEAT INTO THE CITY OF NEW YORK.

1835.—October.		
From England,	17,000 bush.	
Holland,	1,200	
		18,200
1836.—February.		
From England,	34,000	
Holland,	2,000	
		36,000
1836.—March.		
From England,		42,800
1836.—April.		
From England,	33,000	
Germany,	3,000	
Austria,	3,000	
		39,000
1836.—May.		
From England,	17,500	
France,	9,000	
Holland,	4,500	
		31,000
1836.—June.		
From England,	8,800	
Holland,	7,800	
		16,600
1836.—July.		
From Holland,		8,200
1836.—August.		
From Holland,		3,600
1836.—September.		
From England,	15,600	
Germany,	1,600	
		17,200
1836.—October.		
From England,	44,700	
Germany,	24,700	
		69,400
1836 —November.		
From England,	46,300	
Russia,	3,600	
Germany,	53,400	
Holland,	6,500	
		109,800
1836.—December.		
From England,	62,500	
Germany,	51,600	
Austria,	2,000	
Italy,	1,500	
Holland,	2,500	
		120,100
Total imports for 1836,		493,700
		511,900
1837.—January.		
From England,	49,000	
Germany,	75,100	
Holland,	7,500	
Denmark,	1,000	
		132,600
1837.—February.		
From Germany,	76,000	
France,	25,200	
Holland,	8,000	
Russia,	22,000	
Austria,	5,100	
Italy,	7,600	
England	32,900	
		176,500
1837.—March.		
From Germany,	85,200	
England,	146,000	
Holland,	90,600	
France,	1,300	
Italy,	84,800	
Sicily,	5,400	
		413,300
Up to the 19th April, 1837.		
From Russia,	14,000	
England,	2,500	
Italy,	59,100	
Prussia,	8,000	
Germany,	23,000	
Holland,	28,400	
		135,000
Total import to 19th April, 1837		854,000
		1,365,900

VALUE OF THE IMPORTS OF WHEAT, POTATOES AND COAL, FROM ALL PARTS OF THE WORLD, FOR THE LAST SIX YEARS.

Year.	Wheat.	Potatoes.	Coal.
1830,	$492	$9,189	$204,773
1831,	685	7,818	108,250
1832,	1,151	18,436	211,017
1833,	1,606	18,356	261,575
1834,	1,213	15,942	200,277
1835,	18,647	57,901	143,461
	$23,794	$127,642	$1,120,353
Average,	4,133⅛	21,273⅔	188,215⅓

From the Salem (Mass.) Register of June 29.

ANOTHER ELECTRO-MAGNETIC MACHINE.

We called on Tuesday to witness the results of Dr. Charles G. Page's investigations with reference to the application of electro-magnetism as a moving power. He has a variety of models illustrating vibratory, oscillating, reciprocating and rotary movements by changing the poles of a voltaic magnet. The rotary motion is that used as a source of power. We have watched with some apprehension experiments upon this subject, but having seen one of his engines in operation, we are convinced that the application of this power is beyond a question. Dr. Page says that the patent secured for Davenport's machine cannot interfere with him, as he commenced his researches a long time since, and produced his models some time prior to Davenport's application for a patent. He

has, moreover, conducted his experiments entirely independent of any suggestions, and the whole construction of his machine differs entirely from Davenport's.

The small machine which was shown to us presented literally a stupendous operation; apparently at perfect rest from its inconceivable velocity, it produced a hum which was almost deafining. He has hitherto been unable to procure in models of any size a rate of revolution exceeding six hundred per minute; but he lately has made a very important discovery, which, being applied to the model we saw, has run its speed from six hundred up to the astonishing rate of six thousand in a minute. If this be true, (which we cannot doubt from its almost appalling velocity,) the magnetic poles, changing twice in every revolution, must change at the enormous rate of twelve thousand in a minute. This model (though extremely imperfect, having been made by his own hands,) in the opinion of an eminent machinist of this city, will carry a common sized lathe. Want of pecuniary aid has prevented Dr. P. from conducting the experiment as he wishes, but we hope some liberal patron will soon be found to take an interest with him, and we strongly desire to see the full value of the invention first realized in our own city. Dr. Page assures us that he has entirely surmounted the objection that a proportionate magnetic intensity cannot be given to machines of very large dimensions.

We forgot to mention that the maximum speed of the machine is attained in about 15 seconds.

From the Quarterly Journal of Agriculture.

ON SMUT, CANKER, AND RUST OR MILDEW IN CORN, WITH THE ALLEGED AND ASCERTAINED CAUSES, AND MODES OF PREVENTION.

[The following paragraph made part of our introductory remarks to Mr. Bauer's account of the diseases of wheat, (p. 278, vol. ii. Far. Reg.); and it is here repeated, as equally applicable to the present time, and to the different nomenclature used in the following article:

"Notwithstanding all the labors of agriculturists and of the men of science who have written on the diseases of wheat, there are few subjects more enveloped in obscurity, or offering more difficulty to the novice who endeavors to investigate the causes of any of the many diseases to which this plant is subject. It is not so much on account of the errors and mistakes of the various writers, (considerable as they doubtless are,) as to the facts they have asserted, that the difficulty has arisen, as to the want of *clearness and uniformity* in the use of names, and the uncertainty as to what disease is meant by any one particular name. The terms *blight, mildew, rust, blast, smut, scab, stud, stunt*, have been used either in England or this country, so loosely, that it cannot be known what is meant by either, without a very particular description of the symptoms of the disease: and the symptoms are seldom described plainly enough for this end. A great service might be rendered by any person, who, from his acquaintance with the actual diseases, and with what has been published concerning them, could properly adjust terms and descriptions, and merely give a clear account of the opinions entertained in England and America, of the causes and remedies of the diseases of wheat, and how far those of the one country are identical with those of the other. This would enable us at least to profit by the knowledge already existing, but which is sealed up from most persons by the improper use of names, either by the writer or reader—and doubts are thus created, even as to the terms that are properly applied. But far greater benefits might be conferred on agriculture in this respect, if scientific men would pursue the investigation, and not only define the diseases, but search out their causes, and thence the remedies."

Whatever may be the value of the following opinions, as to causes and remedies, the writer, like Mr. Bauer, has the rare merit of so clearly describing the diseases of wheat, that his readers may always know which is referred to—although his names, in two out of the three cases, are different, and in one of them, entirely opposed to terms used by the best informed agriculturists, and in the best wheat districts of Virginia. If we were to take as authorities the language of ill-informed farmers, and of agricultural writers in general, we should be involved in inextricable difficulties by their different names for the same diseases of wheat, and the different applications of the same names. But, even if we confine our comparison to the more recent writers, and those of high authority, the same difficulties and contradictions will be found most remarkable. Thus the disease which, in Virginia, is called *smut* is called "*canker*" by the well informed writer of the following article, and "*pepper brand or smut balls*" by Mr. Bauer, and "*smut*" by Sir John Sinclair in the elaborate article in his last (the 5th) edition of the Code of Agriculture, republished in the Farmers' Register, (p. 337, vol. iii.) At least, both Sinclair and this writer give the same French name "*le carie*," for the disease called by the one *the smut* and by the other the *canker*. If the French are equally loose and incorrect in applying their terms "*carie*" and "*nielle, charbon*," &c. which is not unlikely, then there is additional cause furnished for uncertainty and error. Again, the disease of wheat and oats which, in Virginia, is commonly called "*black-head*" and "*blast*," is certainly the "*smut*" of this writer, and the "*smut or dust brand*" of Bauer. The "*rust*" is applied by this writer as is general in Virginia—but the same disease is generally, by other English authorities, called "*mildew*" and sometimes "*blight*." Thus it is very doubtful, in regard to any writer, who is not very full and clear in describing the disease he treats of, whether his readers may not totally and yet differently misconceive and misapply his instructions. A reformed nomenclature is greatly wanting to agriculture generally—but in no department so much as in regard to the diseases of wheat.—Ed. Far. Reg.]

It has recently been said, that the numerous conflicting opinions as to the cause of smut, render it impossible to recommend any certain mode of investigation to clear up this perplexing subject, and, after all that has been written upon it, the cause of the disease in corn may be regarded as one of those secrets of nature with which the human mind will probably never be intrusted. Not one single opinion has been advanced on this sub-

ject, it is farther said, that has not been refuted; so that it would appear, the more we inquire into the mysteries of the works of nature, the more they are presented to the human mind in a perplexing form.

Now, it is to be feared that remarks of this kind are very apt to damp and deaden the spirit of inquiry, and to prevent the investigation of points which have hitherto baffled research. This, however, ought not to be, so long as the field of discovery is so amply and daily rewarding those who endeavor to extend its boundaries. It is to be lamented, not only that the laborers are few, but also that the inquiries of scientific men are so rarely directed towards subjects of the highest interest to practical cultivators. A striking instance was recently given in this journal of the hop-fly (*Aphis Humuli*,) never yet figured, nor its history minutely written, while other insects of no particular interest to farmers are carefully traced from the moment they are hatched till they die. It sets the apathy of scientific men to subjects bearing a practical tendency in a strong light, that some imaginative remarks, and a few loose and inaccurate experiments, by an unknown anonymous periodical writer who signs Rusticus, respecting the turnip-fly, or rather beetle (*Haltica Nemorum*,) should have been copied as important in almost every journal, both in this country and the continent, yet when these were taken up by a man of science,—J. O. Westwood, esq., Secretary to the Entomological Society,—and shown not only to be erroneous, but impossible: the anonymous writer tardily and reluctantly gives in. Similar fancies, given as actual observations, from the same quarter, have been extensively propagated in a similar way respecting the apple weevil and the burrowing beetle.

In the same way, the greatest errors have obtained respecting the rust and the smut in corn,—the investigation having been chiefly conducted by practical men not acquainted with science, or by scientific men ignorant of practical matters. By passing in review the chief points connected with the interesting subjects of smut and rust, it is not to be expected that errors can be avoided, though it is of high interest to know that several recent discoveries, bearing on the point, tend greatly to lessen the chance of error, from opening new, unexpected, and simple views of the economy of nature in the production of these destructive agents. It is to be hoped that these more correct views will soon take their place in practical works, instead of the prejudices, to call them by no other name, propagated from one writer to another for successive ages. It will be requisite, before proceeding farther, to determine the obvious external characters by which these affections of corn may be distinguished, as there can be little doubt that some confusion prevails both among botanists and agriculturists in this respect. There seems, then, to be three affections of corn apparently very distinct in character, though often confounded (*see Rees' Cyclopædia, Art. Smut—Plenck, infra*,) namely smut, canker, and rust or mildew.

1. *Smut.*

What is termed smut, smut-brand, burnt corn, soot dustbrand, and black corn in England; and *la bosse, nielle, nielle volante*, or *charbon*, by the French, meaning, by these terms, "crimpled, blasted, or charred corn, occurs most commonly among oats, but is also found affecting barley and wheat. Mr. Kirby, (*Linn. Trans.* v. 113.,) Dr. Greville (*Flor. Edin.* 443.,) add rye; but M. Tillet says, he never met with a smutty ear of rye (*Dissert.* p. 133.;) and Plenck says, if it occur at all, it is exceedingly rare in rye (*Patholog. Plantar.* 153.) M. Decandole says, that, besides oats, barley, and wheat, (he does not mention rye,) it attacks millet, maize, and several sorts of grasses; such as *Agrostis pumila, Triticum repens, Avena pratensis*, and *Paspalum dactylis*, (*Encycl. Meth. Bot.* viii. 227.) Kirby adds *Festuca fluitans* and some other grasses. M. Tessier found, by repeated experiment, that bearded wheat was less subject to smut than smooth wheat,* a fact which, if ascertained, would be highly important to farmers, in districts where smut is prevalent.

So early as March or April, M. Duhamel, upon carefully opening the envelopes, and examining the embryo seed, then not one sixth part of an inch in length, found it already black, though he is of opinion it may not always affect the plants at so early a stage. The Rev. Henry Bryant (*Causes of Brand*, p. 42–4) gives a more minute account of the early stages of the affection, though somewhat vitiated by a mistaken theory. When the corn is what the farmers term "in the milk," if it be squeezed, a sweetish liquor oozes out,—the bases of the future farina, which, becoming diseased instead of hardening into ripe grain, grows *oily* and *rancid*, *ferments*, *turns sour*, and *curdles*.—These changes commence soon after the corn is in bloom, and may be recognised by the embryo grain bulging out more than it ought to do, pushing out the chaffy envelope by its swelling, so as to cause the valves to stand more widely apart than they ought to do. This difference in the figure of the ear, will enable the observer to recognise ears affected with smut at an early stage, before any blackness is apparent.

As the ear continues to grow, or, as Mr. Bryant says, "when this *fermentation* is over, but not before," the embryo grain assumes a darker colour, which grows deeper and deeper every day, till it is quite black—constituting the brand. "I opened," says Mr. Bryant, "some of these seed-buds when they were most swelled, greenest, and consequently less forward in their progressive advancement to this sooty state, and found that the curdled milk had not gained every where the same degree of consistence in them. Those parts nearer the surface were driest and blackest, those near the centre clammy, dirty, tinged with yellow and green, and which, by the microscope, appeared of no certain and determinate figure. The particles stuck together, were easily separable into others, and those again separable *ad infinitum*. To the palate, they were not gritty, but soft like the finest flour, melting away without leaving any particular taste behind them, except a little bitterness."—(*Inquiry*, p. 45.) When the distempered ear bursts through the leafy sheath, it appears lank and meagre, and the chaff immediately covering the grain is so thin and translucent, that the black-smut within is easily perceived. If one of the upper leaves on a stem appears streaked or clouded with yellow and

* We believe that bearded and woolly-eared wheat are less liable to be attacked by the wheat-fly than the smooth kinds—EDITOR.

green, or dry and withered at the tip, it is highly probable that the ear will be smutty. M. Tessier says that this character never deceived him.—(*Malades des Grains*, p. 296.) When the chaff bursts, as it speedily does, the spikes or heads look as if they had been charred by fire—hence the terms *brand* and *charbon*. When more advanced, there remains of the chaff only the formless fragments of a whitish colour, intermingled with the black dust. Sometimes, though rarely, the ears are enveloped in a membrane similar to the sheath (*spatha*) of lilies. The black dust insensibly becomes dry, and is scattered by the winds or washed away by the rain, nothing being left for the farmer to house but the barren skeletons of the spikes. (*Tessier*, p. 296.)

The upper part of the stalk of corn infected with smut is usually less straight than a healthy one, the deviation beginning about half an inch beneath the spike; but, as Mr. Bryant remarks, the infected plants, taken as a whole, are more upright than the healthy ones; for the milky juice which should have been consolidated into heavy grain is wanting, and the quantity of matter being much less in the smutty ears than in the healthy ones, will keep them in the upright posture, while the others are bending beneath their own weight.—(*Disease in wheat*, p. 47.) When a stalk of this description is squeezed there, it scarcely yields in the least to pressure; and, if cut asunder at about a sixth part or a quarter of an inch below the spike, it will be found to be entirely filled with pith, so that only a very small tube can be perceived in the centre, instead of the large one always present in healthy plants.—(*Tillet, Cause qui corrompe les Grains*, p. 73.) The stem of smutty corn, when strongly pulled, separates at the first upper joint, and the lower end of this joint is distinctly sweet to the taste, similar to what is observed in healthy plants, a fact which M. Tessier thinks is good proof that the sap is not altered on entering the plant, nor till it has passed higher up than this joint.

Sometimes only a part of the ear is infected with smut. "I have seen," says Kirby, "more than once, half an ear of corn affected, when the other half was good and sound;" and Tessier says, it is in such cases only those grains nearest the spike-stalk which are smutty; while Mr. Bryant has observed even the embryo or germen itself in branded ears as green and well shaped as in those not infected. Sometimes the half of the sheath, or hose, is affected with smut and converted into black dust, in which case the sound part encloses blossoms that are developed and bear grain capable of arriving at maturity, though smaller in size than healthy grain; for, in such cases, the stalk grows more or less after the ear has appeared, while at this period vegetation is quite finished in plants entirely smutty.—(*Tessier.*) The whole ear, according to Bauer, is often found entirely destroyed, many weeks before even the individual florets are entirely developed, or the sound ears emerge from the hose. Sometimes, but rarely, the infection takes place after the blooming, and its progress is then more easily traced. The embryo or germen is generally the first attacked and found partially or half filled with smut; then the pistils, the stigmas, and the anthers. Oats are often later in being affected than barley or wheat, the whole head frequently issuing from the sheath, or hose, to all appearance in a perfectly sound state, or perhaps with only a few black spots on the spikelets at the base; but these spread rapidly, and, even after being separated from the stem, will continue to be destroyed by the smut so long as any moisture remains. "I once," says Mr. Bauer, "collected and cut off several such partially infected ears, which I intended to preserve as specimens, and for that purpose I laid them in brown paper to dry them; they were accidentally mislaid and did not come into my hands again till after a period of six or seven months, when on examination I found the whole specimens were consumed."

The writer of this paper collected a considerable number of smutty ears of oats near Coblentz, on the Rhine, in 1832, and kept them in a wooden box for the purpose of experiment, but the stems now (1837) are as fresh as when gathered. Probably these stems, when gathered, might be in a drier state than Mr. Bauer's, and this may account for the difference.

Mr. Kirby says he could never observe any diseased appearance about the root, and that sometimes it affects all the stems tillering from the same root, while at other times some are healthy and some diseased. The Abbé Tessier is disposed to consider the latter statement, which had also been made by Tillet, as inaccurate; for though, on taking up plants in the fields, he had occasionally found healty and smutty plants apparently springing from the same root, he found, on careful examination, that the roots were not the same, but interlaced so as to be separable. It is certain that the plants affected with smut carry fewer stems—not above two or three—than healthy ones. Besides, the secondary stems which rise from the roots of smutty plants, have rarely sufficient vigor to shoot up many inches.

Mr. Lathbury examined, by means of a powerful magnifier, the black smut powder, and found that it consisted of a number of minute particles of a uniform size and shape, smuch smaller and blacker than those of the canker or pepper brand, and less easily separable, while they seemed to be contained in small cells of an irregular form. Mr. Kirby says that a small shining black beetle (*Dermestes ater*, Marsham) feeds upon it.

The most recent investigations respecting smut are those of Adolphe Brongniart, the results of which we shall now detail. The mode which he adopted was to ascertain what part of the plant is first attacked, how it is first manifested, and to compare the different states of the tissues when affected or not affected.

In consequence of the smut not generally showing itself till the ears are developed and escaped from the hose or sheath, M. A. Brongniart long sought it in vain in very young plants, but at length he was successful. In the month of August he observed a field of barley, in a very poor soil, extensively affected by smut, so as to render it easy to trace it through its different stages. On examining, in this manner, the diseased spikelets, instead of finding every part infected, as is usually asserted by authors, he found that smut was quite beneath the parts of fructification, which had been pushed upwards by the growth of the smut, and reduced to a diminutive size, or what he terms a rudimental state, their interior parts remaining unaffected by the smut. The smut again occupied

an egg-shaped fleshy mass below the parts of fructification, which appeared to be nothing but the foot-stalk supporting the grain, increased to a monstrous size by the disease. On the summit of this fleshy egg-shaped footstalk, were seen the three stamens, with exceedingly short filaments and anthers, of the usual form, but destitute of pollen. The seed organ (*ovarium*), however, was so much shrunk, as only to be traced in the form of two scale-like substances, and a minute ovoid tubercle deprived of stigmata.

From these apparently exact and very minute observations, it follows that, instead of being developed, as usually supposed, in the seed organ and the parts surrounding it, as is the case in canker or pepper brand, smut produces a sort of atrophy, shrinking, or abortion, of all the floral organs, developing itself in the footstalk or peduncle, which it swells out to an excessive magnitude, and transforms it into a mass, first fleshy, and afterwards of a powdery consistence,

It will be evident, from these details, that M. Adolphe Brongniart is altogether original in his observations, which do not correspond in any part with the researches of previous observers, and is directly contradictory to the equally minute researches of Mr. Bauer, who figures the smut as infecting every part of the plant,--the joints, the stem, the leaves, the foot-stalk, the chaff, and all the parts of the flower and the fructification.—Greville also describes it as infecting "the fruit and glumes of corn and various grasses, spreading, and in a short time filling the whole with a profuse black dust." (*Flora Edinensis*, p. 442–3.) Lamarck also says "it springs up under the epidermis, destroying sometimes the whole of the pulp (*parenchyme*) of a spikelet, sometimes of an entire spike." (*Encl. Method. Bot.* viii. 228.) In describing the attacks of smut upon maize, [Indian corn,] M. Decandolle says, "it puffs up the epidermis of the grains so as to change their form, and cause them to attain the size of a plum; and it destroys the mealy substance, imparting to the epidermis filled with black dust no bad resemblance of a puff-ball (*Lycoperdon*)." (*Synops. Plant. Gall.* No. 615, p. 47.) Willdenow likewise says it "occupies the whole ear, which, therefore, cannot form itself properly, every part of it becoming a black, soiling mass." (*Grundriss. Botanisch.* 331.) "Its attacks," says Burnet, "are not confined to the grain, but it equally affects the husks. leaves, and culms," (*Outlines of Bottany*, i. 186); and he makes this statement with Brongniart's figures before him.

2. *Canker.*

What is termed canker, pepper brand, smut-ball, and brand bladders, in England, and *le carie, cloque, chambouale, &c.* by the French, meaning by these terms "cankered, mortified, or putrid grain," occurs solely among wheat, and does not seem to have been observed infecting other grain. It is very distinct from smut, as we shall show, though often confounded therewith.

The Abbé Tessier says it is only the well experienced eye that can detect a cankered ear of wheat before it issues from the sheath or hose, when the stems and leaves are slender, and of a duller green than those of healthy plants. On opening a sheath containing a cankered ear, and spreading the grains, there is seen a small body, of a green color, apparently the embryo grain bulged out, and bearing on its summit the two stigmata without any feathering, and farther down the three anthers, lax and without pollen. If this small body be pressed between the finger and thumb, it emits an unpleasant odor. (*Maladies des Grains*, p. 119.)

In June, when the ears have issued from the sheaths, the cankered ones are easily recognised, by being bluish, more narrow, and the grains more closely pressed to the stem (*rachis.*) At this period the infected grain is covered with a thick green membrane, enclosing a whitish pulp, and still bearing the stigmata on the summit, while the anthers, small and yellow, seem glued along the side of the grain, and do not exceed it in height, The fœtid smell is also now much stronger. (*Tessier.*)

As the growth advances, the spike ceases to have the grains so close to the stem (*rachis,*) and even becomes larger than in healthy plants. The chaff opens as if unnaturally distended, the embryo or germen becomes shorter and rounder, and exhibits the appearance both of swelling and, as Kirby expresses it, "inflammation." Instead of the pale, pleasant green, which is the healthy color of the grain, it assumes a deep dingy hue. The pulpy substance passes successively from whitish to ashy-grey and greyish-brown, and the stigmata are now reduced to the form of slender threads. The maturity of the cankered ears is more early effected than in healthy plants, in the same way as diseased fruit ripens soon. This maturity is indicated by the yellowness of the stems, and the grayish-brown of the cankered grains, which are filled with a black powder, that rarely, as is the case with smut, bursts through the husk or bran envelope; but when it is bruised or opened, emits a fœtid smell worse than that of putrid fish, and when walking to leeward of a field much infested with canker, the smell is scarcely supportable. (*Tessier.*) The wheat plants, as Mr. Bauer says, which are infected with canker, may readily be distinguished by their greater size, being several inches taller than the healthy ones. In all instances of cankered wheat, he found a greater number of stems produced from the same root, the spikes containing more grains, and those more perfect in form. The Abbé Tessier says, he counted as many as sixty-eight grains in a cankered spike, and rarely so many in healthy ones. "One plant," says Mr. Bauer, produced from seed which I had inoculated, had twenty-four complete stems and ears, some of the stems with the ears measuring above five feet, every part of the plant proportionally large, and all the ears entirely infected. Another specimen had eight stems from the same root, five of them above six feet high, and the ears entirely infected; the other three stems considerably shorter, their ears smaller, and the grains perfectly sound.

M. M. Tillet, Duhamel, and Aymer, assures us, that they have found in the same grain of wheat sound white farina in one part, and the powder of canker in the other, but the Abbé Tessier never met with this. He found, however, that some spikes were infected on one side only, while the opposite side was healthy. In some instances, five or six perfectly sound grains were found in an infected spike, and in other cases a few thoroughly

infected grains were found in a spike otherwise healthy; and again, the diseased grains are seen scattered in different parts of the spike, intermixed with the healthy ones. Hence, it would appear Mr. Bauer generalizes too far, when he says that "the infected grains are always in the last spikelet of the ear." Mr. Bryant, indeed, makes a remark quite the reverse of Mr. Bauer, for he says, "in those ears which are partially brairded, the diseased parts are always seated *beneath* the sound and healthy." (*Causes of Brand*, p. 49.) In a quantity of infected grain which furnished twelve ounces and three drachms of canker, the Abbé Tessier found only three ounces of sound wheat.

M. Duhamel having more than once found smut and canker on the same spike, was led to believe that canker was only the earlier stage of smut; but the conclusion, as will afterwards be seen, is not supported by recent discoveries. (*Tillet, Cause qui Corrompe*, p. 75.)

Cankered grain is of a rather oblong form, unequally rounded, and upon the whole resembling sound wheat. At one of the extremities two projecting threads, the remains of the stigmata, and at the other the fibres of the bran-envelope or skin approach, while there is no germ, and the usual furrow is not so deep as in sound wheat.—The color of the grain is greyish-brown, and with a magnifying-glass it appears wrinkled like the outside of a puff-ball (*Lycoperdon.*) The interior is filled with a fine black powder, greasy to the touch, and without taste, and smelling as already remarked of putrid fish. When it has been some hours infused in water, and then examined by the microscope, it appears as a mass of semitransparent globules, very distinct, and adhering to each other as if pressed together. According to Tessier, they vary in diameter from the 140th of a line to the 280th, while those of wheat vary from the 70th to the 560th of a line. Mr. Bauer represents the globules of canker as nearly equal in size, and of the 1600th part of an inch in diamter, —shewing that 2,560,000 would cover a square inch. The grains of canker are very light; a measure which contained ten ounces of wheat, having been filled with four ounces and a drachm of cankered grain, of which six drachms were chaff.

3. *Rust or Mildew*

This in England is termed red-rust; by the Italians, *La ruggine del grano;* and by the French, *La rouille.* It chiefly attacks wheat and barley, but is also found on other grasses and reeds.—(*Greville, Flor. Edin.* 433.)

It has been longer understood than the preceding diseases, having been first, we believe, elucidated in 1767 by the researches of Fontana (*Osservazioni sopra la ruggine,*) who gives tolerably good magnified figures of the rust; and subsequently by Duhamel, Tillet, Tessier, Kirby, and more particularly by Sir Joseph Banks and Mr. Bauer, who have given admirable figures of the parts of plants affected. It first makes its appearance on the upper leaf, and then on the lower leaves and the stem, in the form of small white spots, scattered irregularly like spots made by rain on new cloth. These spots gradually increase in size and number, and assume a reddish tinge, and at length form a sort of dust-looking powder, of an ochre or orange yellow, little cohesive, and without smell or taste, and, therefore, very different from canker or smut. It stains the fingers yellow, as well as the clothes of those who walk amongst the infected corn.

The dust-like substance of the rust originates beneath the outer bark or epidermis of the plant, which it raises up, renders thin, and at length cracks and bursts through. When examined by the microscope, it presents a congeries of egg-oblong bodies, some of which have projections almost like tad-poles or *powheads*, though they are not animated, as M. Ginani seems to suppose (*Delle Malatie del Grano*), for, when the Abbé Tessier put them into warm water, it did not cause them to move. (*Maladies des Grains*, p. 201).

Wheat is attacked with the red rust at different periods of vegetation, but more particularly when in the ear. When the rust seizes young plants, they are said to suffer less than when they are more advanced, often recovering vigor before blooming; whereas at a later period they sustain irreparable damage, and crops which promise well are often in a short time rendered comparatively worthless. In this case the texture of the leaves is disunited, and presents only longitudinal fibres of a brown color, while the joints and the tubes of the straw between are blackened as if they had been scorched by fire, the growth ceases, a portion of the ear becomes yellow, another portion remains green, and the grain shrivels up in the husk without attaining maturity.

The evil, however, is rarely carried so far as this, and the yellow spots of rust become chocolate-brown or black, without disorganizing the portions of the plants where they occur; and the Abbé Tessier says he has seen, after heavy rains, the clothes of the reapers stained with this black substance of the rust as if they had been dipt in ink. But, though the plants are not disorganized, the flow of the sap is interrupted, the ripening of the grain is prematurely hastened, and it is hence light, containing a small proportion of farina, while the straw is bad. Sometimes the rust only leaves a yellow powder on the husks and the upper end of the grains, taken by Fontana and others to be a different species.

Sometimes rust prevails so extensively that few fields escape; but for the most part it is observed in fields sheltered from north winds by walls, hedges, or woods, or where vegetation is very luxuriant on account of fresh soil or abundant manuring. Sometimes one part of a field escapes while the other is attacked; sometimes the chief plants. and at other times the side shoots tillering from them, are affected; and sometimes rusty and sound plants grow from the same root.

We are not by any means certain whether this is the same as the mildew described by Mr. Kirby* (*Linn. Trans.* v. 123,) who makes it very distinct, however, from the red gum and blight. In the year 1797, he says, the wheat suffered much by mildew, as our farmers commonly call it, by far the worst enemy of that grain.—The ears that were injured by it, were to be distinguished at a considerable distance by their blackness; and when brought close to the eye

*Probably *Uredo linearis*, Pers.; *U. longissima*, Sowerby.

they appeared as if soot or some other smutty powder had been strewed over them. Under a common lens, the chaff appeared covered with small black dots, irregularly scattered over it, and widely different from the appearance of the rust. Whenever this appearance seizes the ear, it invariably occasions the grain to shrink so much as to be fit, he thinks, only for feeding hogs, or poultry, but certainly not good for them. Mr. Kirby, writing from recollection, thinks that this mildew was confined to the ear; but farmers told him that the straw also was always injured.

The red gum, as described by Marsham and Kirby, differs in growing usually on the inside of the husks, under the bark or epidermis, like a pustule on the human skin, and through which it at length bursts, emitting a powder of a bright orange color. It does not appear that this injures the grain, for Mr. Kirby has seen ears quite full of it, and yet plump with farina.

Another similar affection, commonly called by the vague name of *blight** (which should be excluded from all such discussions,) is described as growing upon the leaves, stem, and chaff, also under the bark or epidermis, through which it bursts in longitudinal streaks of a black color, causing it to appear split. Mr. Lambert says (*Linn. Trans.* iv. 193,) that, in 1797, it injured the wheat very much, and several fields near Warminster were so infected with it that the farmers cut them down long before they were ripe. Mr. Kirby, on the other hand, says, that, "after repeated examination of ears, the straw of which was quite black with it, in no one instance was the grain injured by it." (*Idem*, v. 122.) It is by no means certain, however, that these writers refer to the same thing.

Alleged Causes of Smut, Canker and Rust.

In the preceeding details, considerable care has been taken to exclude reference to causes real or supposed, except in quoting Mr. Bryant respecting smut. This was deemed the more necessary, that, notwithstanding scientific men have been long agreed as to the chief facts, this is by no means the case among practical agriculturalists, who in many cases adhere to traditionary popular opinion, and practical empirical remedies founded on these opinions. Even scientific men are often, as we shall presently see, biassed by popular opinions, so as to adopt mistaken notions, derived from imperfect or inaccurate observation. It may, therefore, be useful, even at the present day, to mention a few of the alleged causes before coming to the real cause.

1. *Insects.*—Insects which feed on vegetable substances, from being very numerous and of many species, are always more or less apt to be found on corn, whether sound or diseased. Several of these insects, such as the wheat-fly (*Tipula Tritici,*) do extensive damage; but it is of a very different kind from those caused by smut, canker, and rust. It is probable that it was the grubs of this or some other fly which the author of the "Yorkshire Farmer" found in his smutty wheat, which led him to ascribe it to this cause.

M. Tillet gives a very minute account of the observations which he made with the view of ascertaining the effects of insects in producing canker. At the beginning of June he unfolded an ear of wheat from its hose, and saw issuing out of it a swarm of small black insects, rendered very obvious by their color. Induced by this discovery to examine other plants, he found the same insects in great abundance. The insects were long-bodied like earwigs, of the sort termed *staphylinus*. On the smutted ears he found few of these insects, but on the cankered ones he found many of the black insects, together with others much smaller, of a red color, the latter more common during the blooming period. In a word, he satisfied himself that the red insects were the grubs of the black ones, whose eggs and excrements he also found both on healthy and on sound ears.

After many experiments and observations, he could not find that these insects devoured any part of the grain; but he adopted the opinion, without, it would appear, very rigid proof, that they fed upon the pollen, and hence the stigmata being deprived of fecundating stimulus, the grain became cankered,—a cause, as we shall afterwards see, inadequate to produce this effect.

A very intelligent agricultural writer, the late Mr. Sommerville, convinced himself that smut was caused by insects, and founded upon this plan for preventing their destructive ravages.—(*Commun. to the Board of Agriculture*, vol. ii.) By using, in the course of his researches, magnifying-glasses of high powers, and concentrating the sun's light on ears affected with smut, by means of a concave mirror, he observed small insects of the form of wood-lice, perhaps the same as those described by M. Tillet, or more probably the beetle (*Dermestes ater,*) mentioned by Mr. Kirby, for a person not much conversant with insects might suppose either of these to resemble wood-lice. Be this as it may, the author gives it as his opinion, that the smut is occasioned by the small insect observed by him; for the smut-balls being either broken by the flail or otherwise brought into contact with healthy grains, the insects leave the smutted grains, and, adhering to such as are healthy, are sown with them, and wound the tender stem in such a manner as to render it incapable of producing any thing but smut. It may be remarked, however, that this is only conjecture, as insects were not actually observed to have been sown with the corn, much less were they seen to wound the stems; and farther, it was not proved that smutted ears had their stems wounded in any way.

Sir John Call is another supporter of the doctrine of smut being caused by a similar cause.—He maintains that it is produced by certain animalcula, deposited in the husks of the ear when the wheat is in blossom, and that these are fed and nourished by the milky juice in the unripe grain. The reasoning, however, as well as the experiments adduced by Sir John, are vague and inconclusive, as well as in opposition to the best established facts on the subject.

In reference to these views it is recorded (*Farmers' Magazine*, vol. iii.) that an Irishman employed at Alloa in Clackmannanshire, to stamp linens, instructed a farmer in the Irish method of preventing smut by kiln-drying the seed-corn so as to kill the insects. It is said that after the

* Probably *Puccinia graminis*, Pers.; *Uredo Primuli*, Sowerby.

wheat had begun to be heated in the kiln, a great number of very small worms, previously invisible, make their appearance on the top of the grain, and are soon killed by the heat. Now, there can be little doubt of this fact of the appearance of the worms, few parcels of corn being without some species of insect; but this does not in any way prove that these worms are the cause of smut. Although, therefore, the opinion in question was adopted by Linnæus and many others, we may safely conclude in the words of a much higher authority respecting insects, the Rev. Mr. Kirby, that the notion of brand (and he might have correctly added smut and rust) being "produced by insects is not supported by one fact or experiment that I have ever heard of." (*Linnæan Transactions*, v. 120.)

2. *Imperfect Fecundation.*—Amongst the supposed injuries already mentioned, as referred to the agency of insects, the devouring of the pollen holds a prominent place; but independently of insects interfering in this way at the important period of blooming, other causes have been alleged by Dr. Darwin and others to operate injuriously. (*Phytologia*, p. 323.) Heavy rains at this period, by washing away the pollen, may, no doubt, do great damage, as they are known to do to the blossoms of fruit trees; but that this will cause smut, as has been asserted (*Bath Society's Mem.*), is not supported by more than conjectural evidence. Dr. Darwin's analogy drawn from the non-fecundated eggs of fowls becoming addled on hatching, is more ingenious than correct.

M. Duhamel's refutation of all such opinions is quite unanswerable. Smut, he remarks, affects and destroys the organs of both sexes, long before the time of fecundation; and it cannot be imputed to wet or other causes acting on the anthers, &c., for the ears are frequently smutty long before they issue from the hose-leaves, which, continue green till the distemper has made great progress. (*Agriculture by Millar.*)

The opinion of Wolfius, that smut originated in a monstrosity in the embryo seed, is no less erroneous, as it does not agree with the facts observed in the progress of the affection already minutely detailed.

The opinion of the Rev. H. Bryant alluded to above, is partly analogous, as he supposes the disorder caused by the milky juice in the ear running first into fermentation, and then into *brand*, by being prevented from blooming in consequence of the anthers, as Kirby understands him, or as we rather think he means, the sheath-leaf or hose hardening over the ear by the weather, and preventing its evolution and proper blooming, (*Cause of Brand*, p. 51.) But even were it well ascertained, as it is not, that the anthers or the sheath-leaves were so agglutinated as to prevent their duly expanding, this would not account for the disease taking place so early in the growth as it has been often found.

3. *Over-luxuriant growth.*—Dr. F. Hone, in his celebrated prize-essay—the foundation of British Agricultural Chemistry—supposes that smut is caused by an over-abundance of juices, or in other words, from too luxuriant growth; and in this he is partially followed in Chamber's Cyclopedia, where the cause is said to be the rankness of the soil or the use of fresh dung. Mr. Donaldson says, that on rich lands that yield much straw, over-luxuriance, or stagnation and corruption of juices, gives a probable appearance to this being a cause of smut; and we ourselves have frequently observed that stray plants of oats or barley grown on dung-hills, or compost heaps, are very commonly affected with smut. This, however, is too vague an observation, to draw a general conclusion from; and there can be no question, as Mr. Donaldson remarks, that smut is equally prevalent on poor soils, not yielding above fifteen bushels per acre.

It is a popular notion in France, as we learn from M. Duhamel, that the dung of pigeons or of sheep causes smut, probably from some similar observation to the one just mentioned respecting dung-hills; but it did not agree with the experiments of Duhamel, who says, "we have large pigeon-houses, the dung of which is strewed upon our wheat lands, and the same is done with the dung of our sheep, and we even feed our flocks upon those lands; yet we do not find that these fields are more affected with smut than others." (*Agriculture by Millar*, vol ii.)

It appears to be from similar views that Tull, and others, have been led to ascribe smut to too much moisture either of the soil or of the seasons. That wet seasons are more productive of smut than dry ones, there can be little doubt, though this by no means proves such seasons to be the cause of smut, but only that its developement is favored by moisture more than by dry weather. With respect to soils, it does not appear that a greater number of affected ears are usually found in the lowest and richest parts of a field, than in the highest and dryest, facts which have been proved by the observations of Duhamel, Tessier, and other writers of authority. The drill husbandry, therefore, recommended by Tull as a preventive, can in this respect be of little advantage. M. Tillet, in order to put this matter to experimental proof, planted some wheat, which he kept during its growth in a very moist state; but the result was, that it did not produce a single ear affected with smut.

4. *Debility in growth.*—The fallaciousness of the preceding views respecting over-luxuriance, is rendered obvious from the very opposite doctrine having been maintained. M. Aimen, for example, an intelligent French writer, is of opinion, that whatever weakens the plant is apt to produce smut. He proves this view. He thinks, that it is a frequent practice with the farmers on the Continent to cut down their rye, as soon as it spindles, as food for their cattle; and that the rye which tillers up from the cut plants, most commonly on account of weakness, produces distempered ears. M. Aimen also tried the experiment of wounding seed-corn with a needle, and found it subject to smut, similar to that which had been imperfectly ripe, which also is very liable to smut when used as seed.

Similar experiments with those of M. Aimen did not, however, succeed with Dr. Hales, the celebrated author of the "Vegetable Statics," who conceiving that smut might be caused by the seed-corn having been bruised by the flail in the process of thrashing, took a number of grains of different sizes, bruised them with a hammer, and sowed them, but they grew well and were not affected with smut.

Lisle proceeding upon the mistaken notion that

smut only affects grain when the growth is in an advanced state, thinks it is caused by a total want of sap at the root. (*Observations on Husbandry.*) W. Ellis, again, the well known economical farmer of Little Gaddesden in Essex, is led to conclude that smut arises chiefly from want of nourishment in the root.

Debility in growth, besides, is quite inconsistent with one of the commonest appearances of infected corn, that of standing considerably higher in the field than the level of the tops of the healthy plants, a fact remarked by almost every writer on the subject.

It will not be requisite to spend more time in refuting the mistaken opinions which have been promulgated; but we cannot pass over one which refers chiefly to rust.

5. *Influence of the Barberry Bush.*—In consequence of the leaves of the common barberry exhibiting a similar affection to the rust in corn, farmers, both in England and on the Continent, have concluded that the infection spreads from the bush in the hedge to the corn in the field; and this notion is sometimes strengthened from the rust appearing in patches and stripes among the corn, as if it had been carried thither by the wind from the barberry bushes.

Sir Joseph Banks, in mentioning this opinion, says, that "the village of Rollesby in Norfolk, where barberries abound and wheat seldom succeeds, is called by the opprobrious appellation of Milldew Rollesby." But though he himself speaks with doubt upon the subject, he does not absolutely discountenance the idea. (*On Blight in Corn*, pp. 10, 11.) M. Decandolle, in referring to this passage, says, he "would not have agitated the question, had it involved a plant less important than wheat, or a philosopher less distinguished than Sir Joseph Banks;" for it is most obvious to the slightest observation, that corn is often not at all infected even when the barberries in the vicinity are covered with their peculiar rust; and again, corn is frequently covered with rust when the adjacent barberries are quite free from it. (*Encycl. Method. Bot.* vi. 210. A periodical writer remarks, that the rust in the ash, the elm, the barberry, the rose, the bramble, the coltsfoot, the nettle, the groundsel, the dandelion, and numerous other plants, "is as different in species as the plants themselves, and therefore it would be no less rational to maintain that a field of wheat would spring up if we should sow barberries, than that the rust growing on these should produce the corn-rust. Should it be said, that it is the difference of the nutriment of the fungus which causes the difference, I would ask, whether a difference of soil would produce rye or oats where wheat seed only had been sown." (*Paxton's Hort. Reg.* ii. 467.)

Ascertained cause of Smut, Canker, and Rust.—From the resemblance of smut to the powder contained in the well known fungus termed the puff-ball (*Lycoperdon,*) it was conjectured by some of the early writers that it was identical therewith, not adverting to the great distinction of the two places of growth. Even the distinguished botanist Jussieu is reported to have said that the smut was caused by the globe puff-ball; and Sir H. Davy was led to adopt a similar notion from the resemblance of the smut and the puff-ball when chemically analysed.—*Agricul. Chemistry.*

The Abbate Fontana, in 1767, however, was certainly the first writer who had any clear notions on the subject, and his magnified figures in his excellent little work are as well calculated to prove his accuracy and to uproot popular prejudice, as the researches of his distinguished countryman Redi were to destroy the fancies about the spontaneous generation of insects by putridity, blighting weather, and similar vague and impossible causes.

But though this idea was so well developed by Fontana, and has since been elucidated by Bauer and others, the mode in which funguses grow and are propagated was very imperfectly understood, and one leading error on the subject is still very universally maintained, namely, that the growth of the funguses in question, as well as the attacks of insects on growing plants, must be taken only as a consequence of previous disease in the plants attacked. The truth is, that in the case of smut, canker, and rust, as well as in the case of all plant-lice and catterpillars, such as the hop-fly and wire-worm, *it is uniformly the healthiest plants which are attacked.* It is singular that such a mistake should in this instance have become popular, when in other cases, such as the attacks upon fruit made by wasps and birds, it is universally believed the best and finest are selected, though even this is not quite correct, for a wasp or a sparrow will more readily nibble at a wounded grape or a damaged jargonelle pear than at the best sound fruit on a tree.

Dutrochet's Discovery of the mode of growth in Funguses.—In a damp cellar where wine was kept, M. Dutrochet, one of the most original observers of the day, remarked, about two or three years ago, a white looking net-work of fibres, which previous botanists (*Bulliard, Champignons Franç.*) had described as a species of crow-silk (*Byssus*). Being struck with its peculiar manner of growth, he watched it with careful attention, and got M. Turpin, probably the best botanical draughtsman in Europe, to take drawings of it in every stage of its growth. It would lead us too far from the object of this paper, to detail all his interesting observations. The general result was, that the supposed crow-silk was not, as had been supposed, of the genus *Byssus* at all, but the genuine stems, hitherto known as such, of a mushroom (*Agaricus crispus*, Turpin); the mushroom itself being the fruit only, and not as hitherto believed the whole plant. According to this view, then, it would be as correct to consider a bunch of grapes with their fruit-stalk a complete plant, as the fruits termed mushrooms, puff-balls, or puddock-stools; all these being only the fruits of plants generally growing under ground, in the form of small white or grey fibres of net-work, and termed improperly by gardeners *spawn*, indicating that it is the seed of mushrooms, whereas it is the genuine plants.

M. M. Dutrochet and Turpin further discovered, that the seeds, or, as they are termed by botanists, *sporules*, consisting of minute globular bodies, are contained in the cells of fungus fruit in prodigious numbers, and they succeeded in observing these germinate and produce young plants like their parent. There cannot, therefore, remain a doubt, that funguses are produced from seeds in the same way as all other vegetables, though these seeds or sporules are exceedingly smaller than those of green plants—being as subtle, M. Fries remarks, sometimes as smoke.—*Syst. Mycol. Intr.*

Contrary, then, to what takes place with regard to the eggs of insects, which are too heavy to be carried about by winds, and if they were lighter, are generally, when laid, glued to the substances destined for the food of the young when hatched, the minute, light, subtle seeds of funguses and mosses are floated about in the air with the gentlest breeze, and in this way diffused over immense tracts of country, in numbers altogether countless. The discovery of M. Dutrochet is, therefore, of the greatest interest in making us acquainted with the economy of Providence in the propagation of fungi, hitherto altogether mysterious.

What we term smut, canker, and rust, are according to this discovery of M. Dutrochet, only the fruit of particular funguses, the plants of which they are the fruit being hitherto undescribed and unknown, but which must be sought for in the form of delicate fibres, probably transparent, and consequently difficult to see in the textures of the corn affected with these destructive parasites.

It forms no objection to this view, that the fibres of these funguses have not been seen except partially by Bauer and Ad. Brongniart in their microscopical researches, for M. Dutrochet further found, that when the fruit of the plant observed by him (*Agaricus crispus*), sent up its foot-stalks (*stipes*), it became partially detached from the main plant, and, independent of it for its future nourishment, the fibres of the main plant indeed becoming exhausted of substance, and disappearing as may be seen in what were previously supposed to be the roots at the base of the fruit-stalk in the edible mushroom, which supposed roots are the fibres of the main plant, partly exhausted of their substance from nourishing the fruit.

Experiments of M. Fée on Parasite Fungi.—Before M. Dutrochet's discovery, an excellent cryptogamic botanist, M. Fée, tried some interesting experiments on the propagation of the particular sorts of fungi which are under consideration. M. Fée collected a number of leaves of the Burnet rose (*Rosa centifolia*) infected with the common rose rust (*Uredo Rosæ*), so as to be almost covered with it. He then took three rose-trees of the same species quite free from rust, and having planted them in separate boxes of mould, removed them from the vicinity of the rusty plant, taking care, however, to keep them in a similar aspect. He then mixed one part of the rusty rose-leaves, towards the end of winter, with the mould in the box of one of the rose-trees, reserving the remainder of the rusty leaves for another part of the experiment.

When the second rose-tree was in full vigor and near blossoming, some of the affected leaves were frequently shaken over the soil, in order to scatter the seeds or sporules, the remaining portion of which continued attached to the leaves. The rusty rose-leaves were afterwards steeped in water, and the third rose-tree was watered with the mixture during the spring.

Till the succeeding autumn, the time probably at which this fungus (*Uredo Rosæ*) naturally fruits, the three plants in the boxes exhibited nothing particular. At this season the tree in the box where the rusty leaves had been mixed up with the earth became profusely covered with rust, while the other two trees remained quite free. These two were, however, equally affected with the first in the autumn of the second year.

M. Fée infers from these interesting experiments, that the seeds or sporules of the fungi are sucked up with the moisture of the soil by the tips or spongioles of the root-fibres, and that the rust-seeds which in the first rose-tree in the box were mixed with the earth, came in contact with the spongioles before the opening of the buds, when the force of attraction being greater, they were more readily absorbed and developed than after the leaves and flowers have been formed, when the circulation of the sap is less active. At the period when fungi mature their fruit, the wind carries their seeds or sporules in clouds from place to place, while the rain precipitates them to the ground, and washes them into the soil. The viscid nature of these seeds or sporules when wetted with the rain, causes them to adhere to the root-fibres of plants, whence they are sucked up with the moisture of the soil, and carried with the circulating sap into every part of the plant.—*Annales Botaniques.*

Furnished with these sure scientific facts to build upon, we may now consider each of the three destructive species in their order.

1. *Ascertained cause of Smut.*—The parasitic fungus which causes or is denominated smut, is one of the genus justly termed brand (*Uredo*), but differs most distinctly, as we have already seen, from the canker-brand, by being without smell, and also in its mode of growth; for, while the canker-brand continues during its whole growth in the interior of the grain, the smut brand (*Uredo segetum*) at maturity bursts through the envelopes of the corn, where it had previously lain concealed while it advanced in growth.

We have already seen that M. Adolphe Brongniart maintains, that the affection is chiefly, if not altogether, confined to the foot-stalk or peduncle of the grain; but he likewise deemed it necessary to investigate whether the powder of the smut should be considered as a modification of the tissues composing the peduncle when in a healthy state, or if it were formed in a manner different from its natural organization.

The spike-stalk (*rachis*), which supports the grains and the floral organs, in corn and grass plants, is formed of an extended cellular tissue, the cells being placed close to each other without any obvious spaces between them, and also of a congeries of vascular fibres, composed of cells very much elongated, of spiral vessels (*tracheæ*), and the intervals between them (*pseudo-tracheæ*). M. Ad. Brongniart found nothing resembling this structure in the fleshy mass occupied by the smut at any period, though he traced the affection to the earliest period when it could be distinguished. Even at the earliest stage, then, the fleshy mass in the foot-stalk, destined to form the smut, was found to be entirely composed of a uniform tissue, presenting cavities nearly four-sided, and comparatively of considerable size, separated by partitions formed of one or two layers of very small cells.—These cavities, which resemble in structure the cells in reeds and rushes, were in the smutty ears filled by a compact homogeneous mass composed of very fine and minute grains, perfectly round, and all of equal size. They were of a greenish color in the ear when scarcely unfolded, and slightly adhered to each other, though they were only connected by simple contact, being agglomerated towards the centre of each mass. In the

ears more advanced in growth, these minute grains assumed a pale red color. At a still more advanced period, the partitions of the four-sided cells disappear, the minute grains, instead of remaining in contact, become separated from each other, and the whole mass is transformed into a heap of dust, composed of very regularly formed round black grains, perfectly resembling the seminal germs of mushrooms.

It is evident, then, that there is no resemblance between the fleshy mass in the infected foot-stalk, or peduncle of the grain, and the healthy foot-stalk, at whatever period it may be observed. Consequently M. Ad. Brongniart thinks himself perfectly justified in concluding, that the affection does not originate in any diseased modification of the natural tissues, but in the growth of a parasite fungus, whose progress he had thus traced more minutely than had hitherto been done, providing that no previously received opinion is correct.

M. Bauer appears to have performed experiments with smut somewhat similar to those of M. Fée with the rose-rust; but he has not given the details, having only published the results. He tells us he has ascertained, by repeated experiments of inoculation (how performed he does not say), that the seed of smut-fungus (*Uredo segetum*) is absorbed by the roots of the germinating seed-corn, and, being extremely minute, is mixed with and propelled by the circulating sap, which deposites it in almost every part of the cellular tissue of the plant. He adds, that he has not the least doubt that the seeds of the smut-fungus are shaken out by the wind, and that even many infected ears and plants are thrown on the soil of a field where infected corn has been growing, and that the smut-fungi continue growing and multiplying on the soil till they become a part of it and cannot be distinguished.

These views we consider to be scientific and correct, except in so far as the fungi are said to grow on the soil, for this is not proved by observation, and it is probable, from analogy, that they would not grow except within the tissues of vegetating corn or grass.

2. *Ascertained cause of Canker.*—The canker or pepper-brand of wheat is proved to be a fungus of the same genus (*Uredo*) as the smut, but of a very different species (*Uredo fœtida*), well distinguished, as remarked above, by its smelling like putrid fish, and by its not bursting the grain, but remaining within the outer envelope.

The most minute account of the progress of the fungus is given by M. Bauer, whose investigations, however, were unfortunately previous to the discovery of M. Dutrochet respecting the vegetation of fungi. The earliest period, he tells us, at which he discovered the fungus within the cavity of the seed-germ (*ovulum*) of a young plant of wheat sown in November, was the 5th of June, sixteen days before the ear issued from the leaf sheath, and about twenty days before the sound ears springing from the same root were in blossom. At this early stage, the inner cavity of the seed-germ (*ovulum*) was very small; and, after fecundation, was filled with farinacious substance destined to form the flour of the wheat.

It was then that M. Bauer first observed what he describes as the jelly-like *root* or *spawn*, rather the main plants of the fungi themselves, adhering to the lining membranes of the cavities, from which they could easily be detached in the form of small flakes. At this period, it is most important to notice that M. Bauer observed very short but distinct foot-stalks or pedicles seen issuing from the main plant, or what he terms *spawn*, and supporting the fruit. All the parts of the fungus are in the early stage pure white, but when the ear issues from the leaf-sheath, the seed of the wheat (*ovum*) is much enlarged, though still retaining its original shape, and the fungi (or rather we should say the fruit) multiplying rapidly, separate from the main plant, assume a darker color, and lie loose in the cavity of the grain of wheat. The grains thus infected continue growing, the fungus producing within them a great number of fruit, till the period when the healthy grains attain maturity, and become of a light brown. Then the infected grains likewise change their dark green color to a dark brown. When cut in two, the infected grains are found to be quite filled with the black grain-like fruit of the fungus.

By inoculating (in what way he does not say) the finest samples of seed-wheat, M. Bauer fully ascertained that the seeds of the canker-fungus, adhering to the wheat, is taken up by the germinating roots, and carried by the sap to the younger ears, in the same manner as we have seen, takes place with the smut-fungus. "Like a troop of sappers and miners," as Professor Burnet says, "the canker-brands carry on all their operations secretly, and often complete their work before its commencement has been suspected."

3. *Ascertained cause of Rust or Mildew.*—The rust and various sorts of what are termed mildew, are all caused by small fungi, such as the tuft-brand (*Puccinia graminis*, Persoon, or *Uredo frumenti*, Sowerby) and the linear brand (*Uredo linearis*, Persoon, *U. largissima*, Sowerby), which do not differ so much in the injuries which they produce as in their mode of growth and appearance, as has been already described.

The history of the red rust need not detain us, as it has been long well known from the very good account given of it by Sir Joseph Banks, with most admirable drawings by M. Bauer. The opinion, however, which Sir Joseph seems to adopt, is not that the seeds of the rust-fungus get into the corn plants by the tips of the roots, but by the pores on the leaves and stem being carried thither by the winds, and caused to adhere by the moisture of dew or rain. When once entered into the pores, he says—"They germinate and push their minute roots, no doubt (though these have not yet been traced) into the cellular texture beyond the bark, where they draw their nourishment by intercepting the sap that was intended by nature for the nutriment of the grain. The corn, of course, becomes shrivelled in proportion as the fungi are more or less numerous on the plant; and as the kernel only is abstracted from the grain while the cortical part remains undiminished, the proportion of flour to bran in blighted corn is always reduced to the same degree as the corn is made light. Some corn of last year's crop (1804) will not yield a stone of flour from a sack of wheat; and it is not impossible that in some cases the corn has been so completely robbed of its flour by the fungus, that if the proprietor would choose to incur the expense of thrashing and grinding it, bran would be the produce, with scarce an atom of flour for each grain."—*On blight in Corn.*

Prevention of Smut, Canker, and Rust.—Although the ascertainment of the real causes of the destruction of corn, which we have been considering, does not advance our knowledge so far as could be wished of the means of prevention, it teaches us the almost equally important lesson, that many things vaunted as preventives must be totally inefficacious. If M. Bauer's opinion indeed be correct, as it appears to us to be, that the seeds of the smut-fungus, each plant of which, according to the high authority of M. Fries (*Syst. Mycol.*), produces upwards of ten millions of seeds, are scattered on the soil where the smutted corn grows, lying in wait to attack the next crop the instant it germinates, no preparation of the seed-corn before sowing can be of the slightest use. The only likely means of clearing a field thus infected would be paring and burning the soil; or, supposing all or most of the smut-seeds to enter the roots of the next crop, to sow a thick crop of corn and cut it green for cattle, or plough it down as manure, before the funguses arrived at maturity to again scatter their seeds. An abundant liming of such a soil might also prove advantageous, from the lime, while in a caustic state, burning and destroying the seeds.

It is upon the latter principle that M. Bauer recommends the steeping and washing of seed-corn in lime-water, endeavoring to cleanse the corn so effectually that every particle of the fungi and their seed be entirely removed from the grains; "but," he adds, "as these extremely minute fungi, when once mixed with the seed-wheat, insinuate themselves into the grooves at the backs and the beards at the tops of the wheat grains, I think *it is almost impossible to dislodge them by washing*. I once received some samples which had been so prepared and washed in salt-water, and declared to be perfectly clean, but on my putting some of these purified grains into water in a watch-glass, and leaving them to soak about twelve hours, on bringing them under the microscope I found many of the fungi floating on the water."

The lime-water acts as we have seen by destroying the vegetative power of the seeds of the smut, canker, or rust, and it will thus kill such seeds as may be attached to corn by steeping it for twelve hours in strong lime-water, and afterwards drying it before it is sown. In large quantities of corn, however, it is not likely that even by this method all seeds of the fungi can be destroyed, and it will not of course have any effect on those seeds which are already scattered in the fields about to be sown. M. Bauer found, by repeated experiment, that such steeping in lime-water does destroy the vitality of the seeds of both smut and canker in seed-wheat. In oats and barley, the kernels of which are so tightly enclosed in the husks, the lime-water cannot readily penetrate, and consequently the steeping of these is not likely to be so effectual.

It will not be necessary to mention other steeps, many of which are as much calculated to injure the corn as the fungi; but it may be necessary to state, that among the numerous comparative experiments with various steeps which we have perused, we do not recollect one of the least value to found an inference upon. They are all vague and inaccurate, from the genuine causes not being well understood. Experiments on this subject, to be worth any thing, must have the seeds of the funguses actually brought into contact with the roots and other parts of corn-plants at different stages of their growth. Above all, it is important that these artificially infected plants be grown in soil carefully freed by fire from the chance of containing fungus-seeds, as well as to have the corn-plants so enclosed by glass, or otherwise, that the seeds of the fungi might not be brought to them by the winds. All experiments of this kind performed without such precautions, by sowing patches in a field with sound, infected, or steeped seed-corn, are worse than worthless, as the results cannot be otherwise than fallacious.

For the Farmers' Register.

MR. KYAN'S PROCESS FOR PREVENTING DRY-ROT. OR PRESERVING THE TIMBER OF RAILWAYS, BY THE USE OF CORROSIVE SUBLIMATE.

[From the earliest annunciation of Mr. Kyan's discovery, we were impressed with the belief of its important value, and especially for railways—and have already published in this journal the fullest known accounts of the process, (at pp. 320 to 322, vol. ii, and pp. 368, 369, of vol. iii). But the most plausible theoretical schemes often are found opposed by unforeseen and insuperable practical obstructions; and these failures are seldom announced as loudly as the earlier anticipations of success. Hence it arises, that, while new discoveries, alleged to be of great importance, are continually announced to the public, and may be heard of not only in scientific and economical journals, but in almost every newspaper, we rarely meet with statements sufficiently clear or conspicuous, of the many failures of these discoveries, when subsequently attempted to be put to practical use, or of the fewer cases of practical success, or proofs of value afforded by time and experience. For these reasons, we were both informed and gratified by hearing recently, in conversation with Mr Totten, his opinion of the value of this process, and his estimates of the cost of the application to railway construction; and therefore we requested of him a communication on the subject for publication—which has been since received, and is now given to our readers. Mr. Totten's acquirements and practical experience as a civil engineer, give much weight to his opinions on this subject; and even if his estimate of the necessary cost, is but one-fourth of the true amount, there would still be a prodigious saving of the expense of railways, found in the adoption of this plan for preserving timber, and of being able to substitute other kinds of timber, that otherwise are so perishable, as to be totally unfit for use.

Will not the directory of the Raleigh and Gaston Rail Road Company serve the public interests, so far as to make an experiment of this plan, upon a few miles of that railway? Ed. Far. Reg.]

The discovery of an effectual preventive of dry-rot is no longer a matter of doubt. In England "Kyan's process" is now very generally adopted in preparing the timbers for all important buildings—for ships, and for the sills of rail roads. Of how much more importance is this discovery to Ame-

rica, where timber is so abundant, and so generally used! Applied to the preservation of the timber used in the construction of rail roads in this country, the discovery would be of incalculable utility. To show its utility in this particular is the object of the present communication.

The following account of the discovery is taken from the "Arcana of Science," for 1835.

"A gentleman of the name of Kyan, considering the well known anti-destructive qualities of corrosive sublimate, proposed to apply that active body to timbers, in order to secure it from the attacks of the formidable disease to which it has hitherto been liable, arising either from the action of the seeds of cryptogamous plants vegetating in the wood, or from the presence of the albuminous parts of the tree. He thought the evil might be stopped; that the commencement even might be prevented by the application of corrosive sublimate, in consequence of the chemical combination which takes place between the corrosive sublimate and those albuminous particles which Berzelius, and others of the highest authority, consider to exist in, and form the essence of wood; which being the first parts to run to decay, cause others to decay with them.

"Mr. Kyan was so confident of success, that he submitted his proposition to the Lords of the Admiralty, who, in the first instance, required trials to be made, in order to prove the value of the application. These trials were made; and, at the end of two or three years, their lordships advised Mr. Kyan to take out a patent, which he did.

"Dr. Faraday," (in a lecture on the subject,) "exhibited to his auditors some of the pieces submitted to trial by the Lords of the Admiralty, three years before, in the fungus pit at Woolwich. One specimen was a piece of timber which came out, at the end of three years, as sound as it went in, while the unprepared part had decayed up to the very point. No portion of it had been left; it had decayed and become rotten throughout; but the other piece was left whole and sound, and fit for the construction of vessels.

A large cube of wood, which had been there, in the first instance, for three years--found sound at the end of that period, and returned to the pit for two years more, making altogether five years—was taken out perfectly hard and sound. There was no sign of decay in that wood, which had been submitted to the rotting action for five years, nor of that destruction which seems to have come on so soon in the same pit with other pieces of wood.

"Sir Robert Smirke had a couple of posts put up under a dripping eave, and both were exposed to the same action. After a certain time, one of them decayed—the other still stands, having been preserved by the power of this substance.

"Mr. Faraday proceeded to detail a number of experiments which he had made, with a view to discover whether the effects of the corrosive sublimate might be injurious, and which had the effect of satisfying him that it could not be so; and, so far as these experiments went to strengthen his opinions as to its efficacy as a preventive of dry-rot, he says, that he is of opinion that the process would be effectual; and added, 'I think the improvement so great, as fully to justify its extensive application.'

"The experience of five years affords ample security for the success of the discovery. The trials have completely satisfied the minds of all who have interested themselves in the question. At present, the process has been adopted with the timber used in building the addition to the Temple, King's College, Clarkeswell Church, Westminster House of Correction, and Fishmonger's Hall; the National Gallery, the new works at the British Museum, and the warehouses of the East India Company. The London Dock Company have also adopted it, and many engineers connected with the Liverpool, Manchester, and Stanhope, Tyne, and Wear railways, in lieu of stone sleepers.

A writer in the New Bedford Mercury, says, that "he is personally acquainted with the ingenious inventor—has attended the lectures in London on the subject, and is satisfied of the efficacy of his plan."

"The timber to be prepared must be placed in a tank or vessel. A solution of corrosive sublimate is then thrown upon it until covered. The proportion according to the inventor, is 1 lb. of corrosive sublimate, to 5 gallons of water. Pine planks are saturated in forty-eight hours. An oak stick, 40 feet long and 1 foot square, requires three weeks. Pieces of the timber prepared with a solution of the sublimate, and unprepared pieces—the latter well seasoned—were placed in the 'rotten pit,' at the King's Dock Yard, Woolwich, in 1828. In 1831, the writer of this was present when they were withdrawn. The prepared timber was perfectly sound—the unprepared, although of the best English oak, was a mass of rot and decayed vegetable matter. The prepared timber was left on the ground in the open air six months, and then again placed in the rotten pit, with other pieces of well seasoned timber. At the end of two years the prepared timber was found quite sound—the seasoned very rotten.

"The rotten pit, at Woolwich yard, is a cave under ground, 80 feet long by 20 feet, and built by order of government for the purpose of testing the efficacy of the various proposed nostrums for preserving timber. The pit is lined, top, bottom, and sides, with vegetable matter in the worst possible stages of corruption—very damp, and full of carbonic acid gas. It is a perfect hot-bed—a candle will not burn in it a minute, so foul is the air of this subterraneous chamber. In fact, no timber, although thoroughly salted, docked, or seasoned, will resist three months the powerful decomposing qualities of the 'rotten pit.' The specimens were placed on the bottom of the pit, and half buried in the putrid vegetable matter with which the cave is kept supplied. This experiment seemed so conclusive, that government immediately paid the inventor £10,000, and advised him to take out a patent. He was ordered to construct tanks at all the dock yards, and the government timber was immediately prepared in the above manner. It is found that a cubic foot of oak, will absorb three pints of the liquid."

The Lords Commissioners of the Admiralty, appointed as commissioners of inquiry into this important subject, Captain John Hayes, B. Rotch, esq., Professor Daniell, Dr. Birkbeck, and Alexander Copland Hutchinson, esq.

They report: "All the persons examined, who have used the prepared wood, are of opinion that the process renders the ordinary length of time for seasoning timber unnecessary. Sir Robert Smirke,

however, thinks that while timbers of large scantling may be used the sooner for it, still it would not supersede the usual length of time for seasoning wood for joiners' work.

"It was stated by Mr. Kyan that the solution loses none of its strength, and becomes in no way altered by the immersion of the timber; and the greater part of the solution in the tank, at the time of the commissioners' visit to Mr. Kyan's premises, was stated to have been in use some years.

"Two bottles of the solution, used for experiment, were sent to Professor Faraday, one having been filled before the immersion of the timber, and the other afterwards; and he has stated that they contain the same proportions of corrosive sublimate in solution.

"As to the salubrity of the process, the evidence proves it to have produced no ill effect upon the health of the workmen, who have used the prepared timber for ship-building or other purposes. It, however, appears that great caution is requisite in preparing the solution, and in the use of the process."

The only doubt thrown upon the efficacy of the process is, with regard to the "interior effect" it may produce upon large timber, on which point the commissioners are "not agreed;" the extent to which the mercury penetrates the timber being "very limited." But, this "interior effect," it appears to me, is fully settled by experiment.

It is now ten years since the origin of this discovery, during which time experiments have been made in every possible way—in the rotten pit—under dripping eaves—in the confined holds of ships—and in the open air; and in every instance the prepared timber has remained perfectly sound, while the unprepared has "decayed and become rotten throughout."

On the point of expense, 1 lb. of corrosive sublimate is the proportion for 5 gallons of water, (some say 1 lb. to 10 gallons) and one cubic foot of oak timber absorbs 3 pints of the liquid. The price of corrosive sublimate being 86 cents per lb. the material for one cubic foot of timber will cost $6\frac{1}{2}$ cents.

The expense of preparing the timber for one mile of rail road, on the plan of the Petersburg and Roanoke road, would be as follows:

3,500 cubic feet of railing, at $6\frac{1}{2}$ cents,	$227	50
6,000 do. sills and keys, at $6\frac{1}{2}$ cents,	390	00
2 tanks per mile - - - - -	70	00
Labor do. - - - - -	75	00
Total	$762	50

It should be borne in mind, however, that any kind of timber may be preserved by this process. Therefore, any timber found along the line, possessing the requisite degree of strength and stiffness, may be used for the road. On this account a saving may be effected in general of about $150 per mile.

The prepared timber may also be used to advantage in the construction of all the small drains under the road, by which means a saving may be frequently made of from three to five hundred dollars per mile. So that, upon the whole, the actual *extra* cost of the prepared timber may not exceed $250 per mile.

Upon the Raleigh and Gaston, and the Greensville and Roanoke Rail Roads, this would be a fair estimate. With regard to the cost of repairs on account of *rot* upon a rail road, experience has taught us, that the second year after the timbers have been laid down, the evil from this source will have progressed to a degree which will render it necessary to replace many of the rails with sound ones; that in about three or four years the sills also will begin to decay; and that from that time forward, the expense of repairs from this cause will amount to about $400 per mile. In addition to this, the accidents and delays occasioned by the perishable nature of these materials, are serious evils both to the rail road company and to the public, and every possible means should be taken to prevent their occurrence.

It appears then, from the above, that the actual cost of preparing the timber for a rail road will not, in general, exceed $250 per mile. It appears also, that the annual expense of repairs to a road, occasioned by rot, is about $400 per mile.

How valuable then is this discovery? For a sum exceeding but a little one half the cost of the repairs of a road for *one year*, the timber used in its construction may be preserved for *many years*—and, for aught we know, be made as durable as iron.

It may be proper to say something here, in relation to the *time* which would be occupied in preparing the timber for a rail road by this process. With two tanks to a mile, 5 by 6 feet and 25 feet long—upon which supposition I have founded my estimate—all the timber necessary for a single track could be effectually prepared in about fifteen weeks. On this score, therefore, there would be no impediment to the work.

It is hoped that rail road companies will no longer hesitate to adopt this method of preserving the timber for their roads. The experiment, at least, should be tried by every one interested in the subject. So far as my humble opinion is concerned, I think, with Dr. Faraday, "the improvement so great, as fully to justify its extensive application."

G. M. TOTTEN.

From the New England Farmer.

SUGAR FROM INDIAN CORN.

It is said that the Revolutionary heroes used to sweeten their switchel with corn stalk molasses, and perhaps their children may be benefitted by a knowledge of the fact that both sugar and molasses can still be obtained from that plant. How profitable the manufacture of it may be, we cannot say, as we believe no experiments have ever been tried to test the fact, at least in Maine. Some experiments were once tried in the south of France, in order to ascertain the quantity which could be obtained, and the following were the results:

1. The stalk of the corn contains little or no sugar previous to flowering.
2. At the time of flowering a small quantity of sugar may be detected.
3. When the grain is still soft, the stalk contains about one part in a hundred of chrystallizable sugar.
4. When the grain is completely ripe, the stalk contains two parts in the hundred of sugar, and four parts in the hundred of rich and good tasted molasses."

The pomace may be given to cattle, or made into wrapping paper. It is not known how far the above calculation will agree with the plant in our climate. We shall probably not need this article to manufacture sugar from, so long as it can be obtained in large quantities from the maple, sugar beet, &c. But the fact may be important in one point of view. If the statements are correct, the stalks are more nourishing for cattle, if cut when they are ripe, than if cut earlier, and as they are cut for this purpose, a little judgment exercised in the business, founded on a knowledge of the properties, may make no small saving.

From Loudon's Gardener's Magazine of June, 1837.

THE ITALIAN MODE OF EXCLUDING THE COMMON HOUSE FLY (MUSCA DOMESTICA L.) FROM APARTMENTS.

This mode was pointed out to William Spence, esq., in Italy, two or three years ago, and is published in the first number of the *Trans. of the Entomological Society;* and his son has subsequently discovered that it was known in the time of Herodotus, and practised by the fishermen of Egypt. It is simply to cover the openings of the windows by a net of white or light-colored thread. It is remarkable that the meshes of this net may be an inch or more in diameter, so that there is actually no physical obstacle presented to the entrance of the flies even with expanded wings. The flies seem to be deterred from entering from some inexplicable dread of venturing within the network. It is even found that, 'if small nails be fixed all round the window frame, at the distance of about an inch from each other, and threads be then stretched across both vertically, and horizontally, the apparatus will be equally effectual in excluding the flies.' It is essential, however, that 'the light should enter the room on one side of it only; for if there be a thorough light, either from an opposite or side window, the flies pass through the net without scruple.' (*Trans. Ent. Soc.*, i. 4.)

"The above facts are of interest both to the occupiers of houses and shops in temperate climates, and the architects of houses for warm countries. They also supply useful hints to butchers, and, indeed, to all persons to whom flies and gnats are an annoyance. The facts further show, that sciences apparently the most remote from architecture, may yet afford useful hints for improving that art. To gardeners these facts afford excellent hints for excluding flies from vineries and peach-houses, and from ripe grapes and other fruit against walls.—CONDUCTOR."

From the same.

MR. ANDERSON'S MODE OF PROTECTING SEEDS FROM THE ATTACK OF BIRDS,

By suspending a black thread line over the bed 10 inches or 12 inches high. I was induced to try the plan, being much annoyed by sparrows and pied or chaff-finches; and I feel bound to state that I have found it very efficacious, the birds seldom going near the beds when threaded. I noticed a congregation of finches, a few days ago, upon a cherry tree, near to an asparagus bed sown with raddish and edged with mustard and cress, but guarded by the threads. One of these dropped down and reconnoitred; and flew up again, after parading nearly round the bed. Another or two did the same; and one ventured upon the bed; but it soon flew away, and the whole followed. I have other seed-beds guarded with the thread, and find the plan answers. It is so simple, and so useful, that Mr. Anderson is entitled to the thanks of all gardeners. It only wants a fair trial. If market-gardeners, who sow great breadths of the Brássica tribe, as well as other seeds connected with their business, were to employ this method, I have no doubt one half the seed generally used might be saved; the expense of thread and time in putting it up being comparatively nothing. I should advise the thread to be no more than two feet apart in lines; and when the beds are long, to support the line every 3 or 4 yards with slender forked sticks, firmly fixed in the ground.

From the same.

WHY ARE CHAFFINCHES DETERRED BY A LINE OF BLACK THREAD, WHEN THEY DO NOT DREAD A THREAD WITH BITS OF RAG ATTACHED TO IT?

It has struck me that this curious fact, mentioned by Mr. Anderson (p. 172.), is quite analogous to the circumstances stated by Mr. Spence in the *Transactions of the Entomological Society* (described in the *Architectural Magazine*, vol. ii. p. 188., and quoted below), that flies will not pass through a net with the meshes one inch wide, by which means rooms may be kept quite clear from them by hanging a net of this kind in front of the window. To what is the existence of dread in both cases attributable?—J. O. W. *May* 17, 1837.

From the same.

THE INTRODUCTION OF AMERICAN PEA-BUGS (*Bruchus pisi*) INTO EUROPE.

Seeing, on the cover of your Magazine for April, 1837, that you request gardeners, bailiffs, and others, to forward any kind of insects to you for Mr. Westwoods's examination, I send these, of which I shall shortly give you the history. I received two packets of early Dutch peas, which were distributed among the members of the Hampshire Horticultural Society, on March 10, 1837. When I came to open the packets to sow the peas, about the beginning of April, I found them full of the insects sent, which were such as I had never observed before. I then determined to forward one of the packets to you, in the hope through that means to know its name, and if it is common.—A CONSTANT READER. *Winchester, May* 15, 1837.

The insects sent with this communication are the Brùchus pìsi of Linnæus, in a living state. This species, according to that author, is indigenous to North America, but is now, unfortunately, completely naturalised in the north of Europe, although, seventy years ago, it was only known in the more southerly parts of this continent. Of this insect Kirby and Spence observe: "In a late stage of growth, great havoc is often made in peas by the grub of a small beetle (Brùchus granàrius *L.*), which will sometimes lay an egg

in every pea of a pod, and thus destroy it. In this country, however, the mischief caused by the Brùchus is seldom very serious; but in North America another species (*B. pisi L.*) is most alarmingly destructive; its ravages being at one time so universal as to put an end, in some places, to the cultivation of that favorite pulse. No wonder, then, that Kalm should have been thrown into such a trepidation, upon discovering some of these pestilent insects just disclosed in a parcel of peas he had brought from that country, lest he should be the instrument of introducing so fatal an evil into his beloved Sweden." (*Introd. to Ent.*, vol. i. p. 178.)

Here it is evident that the injury is caused to unhoused peas. But Stephens, speaking, of this insect, says, "Found occasionally within the metropolitan district; but, I suspect not a truly indigenous species: it sometimes abounds in depositories of peas to a very destructive extent." (*Illustr.*, vol., iv. p. 213.) Its precise habits, with indications of the periods occupied in its transformations, and especially of the time when it arrives at the perfect state, have not been ascertained, although very necessary, as the destruction of the beetle, previous to laying its eggs, would greatly prevent the spreading of the mischief.—J. O. W. *May* 17, 1837.

P. S. I observe that, in almost every instance, it is the largest peas which are attacked. The insects are still enclosed in some of them.

MARLING.—THE FOUR-SHIFT ROTATION.

To the Editor of the Farmers' Register.

Shirley, July 10th, 1837.

Your account of the "Shirley farming and crops," in your "Memoranda of hasty visits to the country," though upon the whole rather flattering, shows the effects of the eight weeks' drought we suffered, from early in April until 12th of June; and I wish you could now see the change in the crops, wrought by the last three weeks repeated rains, (which gave us great trouble in the wheat harvest, but which were the salvation of the oat and corn crops,) and I think you would be in a better humor with our system. The oat crop, though not a full crop, is now a very fair one, and the corn promises to be a very heavy crop. Even the 45 acres which was twice destroyed by insects, and ploughed up, and replanted so late, is now very promising; and, if we have a seasonable fall, will make a full crop after all. The marled land still maintains its superiority over the corn along side of it; but that is improving very fast. The marled land is not quite thick enough, or I believe it would make as much corn to the acre as any land is capable of, in this part of the world. I think, if it were a third thicker, it would make fifteen or eighteen barrels to the acre; and, as it is, I think it will make twelve barrels to the acre. It is as heavy a growth of corn, (except that it is not quite thick enough,) as I ever saw. I had no idea the marl would have produced so great an effect, and, therefore, I did not plant it thick enough, for it was by no means very strong land before it was manured and marled—very inferior to most of the land in the corn-field of 160 acres. In fact, it was selected, as the poorest in the field, and the most infested with sorrel, (which is generally a sign of lands being exhausted,) to be marled.

While writing, I cannot let your strictures on my favorite four-shift system pass without some notice, and I will, therefore, call your attention to some of them. In your "Memoranda of hasty visits to the country," you object to the manure's all being applied to the clover fallow for wheat, and say you doubt much whether this manure does not serve to increase the product of straw in a far greater proportion than grain, and that it increases the risk of rust," &c., &c. Now, the fact is, that my manured land invariably matures the wheat better than any other part of the field, and has less rust. In fact, I never saw the rust in wheat on land lately manured in my life. Manure is a sovereign remedy for all diseases of wheat—and a good clover lay is equal, or nearly so, to a heavy manuring; and the four-shift system is one of the best, if not the very best way of getting a good clover lay. In the four-shift fallowing system, on good land, (and I never advised poor land to be put into the system, but rather advised Col. Taylor's four-shift corn system for land that would not bear it,) you are certain of a good crop of wheat after clover fallow. (For even last year, the most disastrous of all years for wheat, I made a fair crop on my fallow.) You are also certain of a good crop of corn. (I have never yet failed in making a good crop of corn, on good land, after clover-fallowed wheat.) And the third grain crop, wheat after corn, is never very good, to be sure; but we do not expect much from corn-field wheat. It helps out, though, and answers admirably as a preparation for the clover crop, which is the main stay of the system. The fallow wheat is the most profitable crop; the corn is also a profitable crop, and the cleansing crop; and the corn-field wheat, though not very profitable, is the preparatory crop for the clover, and helps out into the bargain. I say we never expect much from the corn-field wheat. And, let me ask you, did you, or any one else, ever see a heavy crop of wheat after a heavy crop of corn, in any system—three-field, five-field, or any other system? For, if you did, I never did; that is to say compared to fallow wheat. In our four-shift system, it is not desirable that the corn-field wheat should be a very heavy crop. For, if it was, it would smother the young clover sown on it, which would be the destruction of the system; for we rely principally on the clover to restore the land after the three grain crops. Clover would never succeed on wheat, as heavy as our fallow wheat generally is. It would all be smothered, nine times out of ten.

In your "Memoranda of hasty visits to the country," you also say the whole growth of clover, and large supply of manure, "enable the wheat to withstand all attacks, and sources of great damage usual to the crop elsewhere," (which is saying a great deal in favor of the system,) "except the evils produced by luxuriance of growth. Thus the loss in labor, if not in grain, from lodging, will be considerable this year, and is suffered more or less every year: and rust coming on just before the ripening of the crops of the highest promise, has repeatedly caused great loss here, when the poorer lands elsewhere generally were but little hurt." You are entirely mistaken in supposing that the poorer lands in my neighborhood were

less injured by rust whenever I suffered. The poorer lands in my neighborhood, and the poorer parts of my own plantation, particularly the stiff and clayey lands in my neighborhood, always suffered most whenever we had a rust season; and since I have improved my land, I have had much less rust than before, as was to be expected, as it enabled me to sow much thicker, and thereby prevent the rust in a great measure—thick sowing being one of the very best means of preventing rust. I suffered very much from rust three years in succession—in 1820, 1821 and 1822, (and again somewhat in 1825)—but not more, either of the years, if as much as my neighbors; and since 1825, or since the chief improvement in the land has occurred, I have suffered very little from rust; and with a good clover lay, extensive manurnuring, and thick sowing, I do not dread rust at all, except on a few cold clayey bottoms.

You say in your memoranda, that our system "imperfectly executed, would be a wretched one, both for annual profits and for improvement of the land." What system, badly executed, would not be? But we contend that our system, well executed, is both profitable and improving; and though the improvement is slower than in a milder course, yet it is more profitable, on good land, which will yield good clover lays. You say, in your memoranda, "that the oats are inferior, and cannot be made a fair crop. The clover is very poor, but neither crop shows as badly as the corn at Shirley, which, in general, is worse, compared to the producing power of the land, than any well tilled field I ever saw at this time of the year." You go on to assign the reason, being owing to the unprecedented drought of eight weeks, and insects, &c., and then wind up by saying, that "the loss that will be certainly suffered in this crop will be a heavy offset against the advantages of the rotation, as it stood before the introduction of a corn crop;" but the corn crop is an important part of the system, and one which, by dear-bought experience, I have found to be necessary, as a cleansing crop. I tried the oat crop as a cleanser, while I had the reclaimed swamp land under cultivation, but found it would not answer, on account of the weeds, blue grass, wire grass, insects, &c. getting ahead, and stated the fact in one of my communications to you. But that does not make against the system, because I deviated from it, and thereby suffered for it. But the fact is, that I have not suffered so much as you suppose, in crop—though I have suffered in having additional labor and trouble from the want of a hoe crop; for I have generally succeeded in making a good crop of corn, although I have found great difficulty in getting my corn to stand early in the year, owing to insects. I have succeeded at last, and generally make good crops; and hereafter, when I shall have gone through the rotation, (as now including corn,) I expect no more difficulty with insects, than farmers with other rotations; for I am sure that a hoe crop, once in four years, will be sufficient to cleanse the land of both weeds and blue grass—my greatest enemy in the wheat crop for several years past—and insects of all kinds.

The oats and clover being inferior, (though they have improved vastly since the rains, and now promise to make a fair crop,) is not to be wondered at, for such a drought in the spring is, I believe, unprecedented. We had little or no rain from the 7th of April, until the 12th of June, upwards of eight weeks, and every thing wore the appearance of a long drought in August and September—pastures burnt up—trees dying, and dust flying; and the great wonder with me was, how the oats and clover lived at all. And I think it speaks wonders for the system, that we now have so good a crop as we have. The corn suffered more than usual with me this spring, because the great drought, and very cold weather, prevented the corn from growing off kindly, in the spring, except on the sandy land, and marled land; and, as it could not grow, the insects were enabled to eat it up. If we had had either rain or warm weather, to give the corn a start, it would have soon outgrown the bugs; and the land which has now the worst corn, would have been the best, as the land is better where the corn is worst, though, owing to the quantity of vegetable matter turned under, there are more insects there. I only want the marl or lime in addition to the vegetable matter in my land, to make it succeed on our system in any season.

I only commenced this to make a few remarks, and I have prolonged it until both you and your readers will be heartily tired of it, I am afraid.

HILL CARTER.

[We are gratified to receive the foregoing corrections of our very hasty, and of course very imperfect observations in the preceding No. Corrections of errors, or strictures, have frequently been invited, whenever we ventured to submit any such results of observations, made in hurried and chance-directed excursions; and if they were given, frankly and fully, whenever needed, we should be the more encouraged to present such subjects for correction; as thereby we should succeed in furnishing matters of instruction and interest to our readers, by drawing *indirectly* from other sources, much better than can be done *directly* from our own.

It certainly was not designed to present any thing in a more "flattering" or even more favorable point of view than the appearance of things then seemed to warrant. We claim for all such of our "memoranda," the merit of entire freedom from the bestowing (knowingly,) undeserved praise either on men or things—though, of necessity, they are liable to be often incorrect in estimates of the merits of both.

We admit the erroneous deduction made as to the cause of rust, the effects of which were known to have been formerly and repeatedly so injurious at Shirley; and the facts which furnish the contradiction, are both striking and important. It is certainly much in favor of Mr. Carter's practice of applying manure, (whatever may be the theoretical objections,) that it should increase the security of the wheat crop against rust, and other smaller disasters. Still, however, we hold to the doctrine of *giving manure to grain only through the medium of grass*—and maintain that it should be observed as far as circumstances permit; though *circumstances* are continually occurring, on the best managed farms, which direct and compel deviations of particular practices from what sound theory would require, if nothing else were in question, or at risk.—ED. FAR. REG.]

ON THE USE OF REAL SIGNATURES TO AGRICULTURAL COMMUNICATIONS.

To the Editor of the Farmers' Register.

Your correspondent, "The Eastern Shore of Maryland," in the June number of the Farmers' Register, is very severe, and appears to be quite angry with those who, differing from him in opinion, presume to affix their names to their facts, in the belief that it may afford some security against imposition. He holds the practice unnecessary, because he deems the "*editor*" responsible for the truth of *facts*—and, he considers it very immodest.

To me, though unconcerned in the matter, except so far as to seek the truth, it seems unreasonable to hold the editor of a *periodical devoted to agriculture* responsible for facts communicated by his numerous correspondents in all sections of the United States—a large majority of whom, he may have no personal knowledge of—and who may have erred in their statements, or in their observations, innocently or wilfully, as the various propensities of their minds may have influenced them. The *editor* certainly cannot determine their respective motive powers, and, therefore, he cannot, *justly*, or *reasonably*, be deemed responsible for the effects of them.

For *libellous*, or *defamatory* facts, it is true, the gentleman's position may be correct—the editor may, for such, be responsible; but, for the simple statement of *unoffending*, *agricultural* facts, I am inclined to believe, it will be generally admitted, that the reason and the ground of responsibility are absent. Your correspondent, in his "*modesty*," which he says, is the "crown of many virtues," requires that Virginians, North and South Carolinians, and all others, who, with *his arms*, shall subdue the pestilent enemy, "the weevil," shall make their acknowledgments in the Register, &c. &c. to him, as the author of the remedy of burning sulphur in the infected granary, for the destruction of the weevil. Being a "retired farmer," he might have had time to read in two of the best "periodicals" on agricultural subjects, which this country has produced—"the American Farmer" and the "Farmers' Register"—that this remedy had been recommended for the destruction of the weevil, in the former, for about fifteen years, and, in the latter, about three years. Had he affixed his name, he would probably have been more careful in the perusal of these works, and would have discovered that the remedy is *not novel*. Your correspondent "has known some half witted" and "half educated" gentlemen in Maryland, who would have "got on tolerably well," but for their unhappy propensity to scribbling over their proper names;" and he advises them of the residence of "*Dr. Syntax*," in Virginia, for their benefit. He might have been sensible of the fact, that *typographical* errors are frequent at all presses; and, ordinary liberality would ascribe to this cause, the palpable errors, which often occur in the orthography, as well as in the structure of a *printed* sentence. And he should have remembered, too, the old adage, "that he who lives in a glass house, should not throw stones."

* * * * * *

In truth, and in candor, I write this remonstrance, not that I am personally concerned in the case, nor that I care about "*blazoning*" the name, but in the earnest hope, that the "Eastern Shore Farmer of Maryland," and all others, will preserve that mutual fraternity of feeling, which, in all communities, is conducive to the individual and general good, and happiness—and which, in the much neglected community of agriculture, is peculiarly essential to its prosperity. And, I regret to have read in your "Register," asperities of remark, produced by a mere difference of opinion, which may occur with the most honest, and most enlightened members of any community. And I have adduced the instance of a very clever, and, possibly, a very correct writer, offending "Dr. Syntax," either by himself, or his printer, to show the propriety of a liberal construction, even upon the palpable errors, though numerous, of

BROTHER FARMERS OF THE E. S. OF MD.

[The foregoing letter exhibits "asperities of remark," which we are sorry to see in the Farmers' Register; nor would they have been permitted to appear, but in reply to other remarks, which, though general, and which we did not, and still do not, suppose had a particular allusion, and certainly had none that was manifest, to any one of our contributors, yet reflected harshly and improperly upon one distinguishing characteristic of our most valued and useful correspondents—and who *are* the most useful *because* that their names are permitted to authenticate their statements. We know that our present correspondent does not even suspect who is the other, and it is believed that neither of them designed to apply his remarks to the other, as an individual; and as each has now shot his bolt, and (though in the dark,) with sufficient force, we hope that the controversy may be suffered to end here.

We regarded the remarks signed the "Eastern Shore of Maryland," in the light of a condemnation of our own opinion as often expressed on this subject, and of our own practice too, (in many cases when communicating statements of facts,) fully as much as a censure of any other individual. Our communications to the Farmers' Register, (not in editorial form) have been usually placed upon the footing which we have recommended to others. Pieces of merely a theoretical, argumentative, or didactic character, have often been presented anonymously—but practical articles, and statements of facts, have usually been either given over the real name, or signed by initials nearly as well known. That we have ever used initials, or written anonymously, on any subject of practical agriculture, has been owing to our position as editor, and the fear of appearing unnecessarily conspicuous, in the different character of a contributor. Still, to our own course in this respect the general censures of our former correspondent were sufficiently applicable: but, as they were not considered as designed to apply to any particular individual, we, of course, took no offence at being made to bear our full share of the attack. No other person had any better ground to be offended, unless indeed the censure was meant, and appeared to be meant, to apply to a particular writer. We entertained no such suspicion then, nor do we now.

We deemed it quite unnecessary, at the time, to comment on the strictures of the "Eastern Shore of

Maryland," for the purpose of maintaining our opposite opinion—which, however, has been not the least shaken by his argument, and we earnestly hope that no one of our correspondents will be more affected by his expressions. While all writers are welcome to this journal, who have any information to give, whether anonymously, or under their proper signatures, we repeat, what we know to be true, that statements of facts lose half their claim to credit, half their interest and their chance of being useful, by being anonymous. Even the writer of the "Eastern Shore of Maryland" has given some evidence of his concurrence in our view—for some of his contributions (and for this reason the most valuable,) to this journal, have been made over his real signature.

In conclusion, if we cannot guard against, or remove, every feeling of anger from both our highly esteemed and valued correspondents, we at least trust that neither will hereafter be disposed to criticize too nicely the other's pieces, (if they should be known as such under other signatures.) It is a safe rule, for all verbal and literal errors to be charged, by *readers*, to the carelessness, or misconstruction, or ignorance, of the printer or the *editor;* and it so happens that both our correspondents sometimes need such favorable construction, because the writing of both, though very correct in design, is so illegible in fact, that it is rare than either can communicate with the public in print, without suffering somewhat by typographical mistakes—which, in most publications, as well as this, are sufficiently numerous, even when no such *sufficient* excuse is furnished to the printers by the writers themselves.—ED. FAR. REG.]

From the Mark Lane Express.

LANCE'S "ANIMALIZED CARBON."

SIR—A correspondent in your last week's paper, asks the question, "is it possible to form a factitious bone dust, by impregnating lime with phosphoric acid, so as to form a cheaper manure to the farmer, than the present expensive bone dust, and which is often not to be got in sufficient quantities? To this query I decidedly answer yes. It is now done, and selling in large quantities in London; prepared somewhere in the neighborhood of the Regent's Park, and known as Lance's Animalized Carbon. The article was first prepared in Paris, the agricultural society of that city having awarded the inventor a considerable sum, and subsequently at Copenhagen, from whence Scotland has hitherto been supplied, and where its use has given the fullest satisfaction.

I have procured Lance's preparation from an agent at Basingstoke, and like it as well as bone dust—much better indeed than the coarser sort. That it is composed of phosphoric acid with lime, any chemist may convince himself; but when it is known that human urine and fœces are considerable ingredients in the compound, those who have read it will be satisfied that phosphoric acid may be extracted from these matters; but to prove its similarity to bones, I have mixed about one-fourth quantity of lime in the state of dust, and am quite satisfied with the results. With respect to price, mine cost me little more than half what I have paid for bones. As to the second question, "it is granted that phosphoric acid is procured from bones; but where does nature procure it to form these bones?" To answer this question fully, would lead too much into scientific inquiries, for a newspaper paragraph, and not be interesting to the general reader; but I will briefly say, that the acid in question is found in the earth, and pervading many vegetables, and all animals, as well as their excrementitious matters; that it is taken up by all corn, particularly wheat, as has been proved; which gives out the acid in union with lime for the formation of bone. The milk of the mother is found to yield the largest quantity of phosphate of lime at the period of bringing forth the offspring. The chick in the egg receives the bony substance from the shell, hence it is thinnest at the latter period of incubation. Your correspondent may, with equal propriety, ask why this is so, as to inquire where did nature procure the acid. All I recommend is, that he tries some Lance's Animallized Carbon, as a substitute for bone dust, and if not satisfied with that answer, let him say so, and he will be further informed by

A SURREY FARMER.

April 27, 1837.

From the same.

ON BONE MANURE.

SIR—In your paper of the 24th of April, is a letter from a correspondent respecting the possibility of manufacturing a factitious bone dust, by impregnating lime with phosphoric acid, so as to form a cheaper manure than that procured from bones. In answer to that question, I beg to say, that there is not any means by which lime can be impregnated with phosphoric acid, for the purpose he intends it for, as there are not any cheaper or readier means of obtaining the acid, than from that of *bones*. In proof of that, it is only necessary to state, that it is the source always applied to by such chemists and manufacturers as require its agency. There is a natural phosphate of lime which is known under the name of assatise and asparagus stone, which is only found, in any quantity, in Sweden and Spain. As to the question, where does nature procure it, to form these bones, I cannot afford any information, as it is one of the many physiological facts that has long puzzled the scientific. True it is that many vegetable substances contain a small quantity of phosphoric acid in combination with lime, magnesia, and iron, but nothing in proportion to the mass required by the animal frame, for duly impregnating the bone; for, the bone, you are aware, is a frame work of gelatine, rendered firm by a *deposition* of phosphate and carbonate of lime. Vauquelin and others, by their experiments, have proved that there is an insufficiency of the phosphate taken into the system to supply the required quantity; and this has led many to assume that phosphorus is not a simple body, but that it is generated out of other materials in the body; it is moreover well established that animals give out more phosphates than they have taken in, and that after having supplied the system with what it is in need of for the support of the bones. While on this subject, allow me to observe, that I think there has been some error in ascribing the benefit derived from bones as proceeding from the phosphate of lime they con-

tain; that it may have beneficial effect is very possible, but requires direct experiment to prove it, for it is to be borne in mind that bones, as they are now applied, are not entirely phosphate of lime—no, nor yet one-half of it, for in every 100 parts of bone there is

Solid Gelatine,	51
Phospate of Lime,	37 . 7
Ditto Magnesia,	1 . 3
Carbonate of Lime,	10
	100

Giving little more than one-third of phosphate of lime. Now, from the circumstance that all decomposing *animal* matter has a most determinate effect on the accelerating of vegetation, I am strongly inclined to believe that it is the gelatine that plays so very conspicuous a part in the bone dust; this view is supported from the fact of the length of time a dressing of bone dust lasts; for bones that have been long buried in the earth have been found after many years to still retain a portion of the gelatine, at the same time hardly any of the phosphate has disappeared; now, as vegetation is always affected by an *active* principle, one would be led to assume that the *manure* had been derived from the gelatine which had disappeared more than from the phosphate which had remained, it is, in my opinion, this property of *slowly* parting with its gelatine that renders bone dust capable of effecting the crop so long after it has been applied; whether I am right or not, direct experiment can alone decide; if I am, then it is certain that the dealers in bones deprive them of a great deal of their nutritive properties by first boiling them, as they are accustomed to do, to obtain the fat, and in some instances part of the gelatine.

I cannot close this communication without adverting to a letter in your paper of the 1st instant, signed a "Surrey Farmer." A Surrey farmer he may be, but I am strongly inclined to think he is Mr. Lance himself, from the tenor of his letter. If he is acquainted with chemistry as he would lead one to believe, he must know that "animalized carbon" is pure nonsense, and the term can only have been invented to beguile the innocent.

That excrementitious matter is highly beneficial when applied as manure, no one can deny; there is none perhaps equal to it for the generality of land; but to say that animalized carbon, provided it is composed as he sets forth, is the same as phosphate of lime, is a most gratuitous assertion; for, in the ingredients he mainly depends upon for constituting its identity with bone dust, there is in urine only 294 in 1000 parts, and that only from adults, as young persons do not give it off, and in fæces there is scarcely a trace; neither is it any answer to your correspondent; for, if I do not mistake his meaning, he wishes for a substitute that can be made at home. I know nothing of Lance's compost, never having seen any one who has tried it; but this I know, that if its principal ingredients are such as stated by the Surrey farmer—Lance could not sell it at 1s. 6d. a bushel, nor at any thing like the price of bone dust.

As to his observations respecting the sources from whence phosphoric acid is procured by nature, I have, by anticipation, in part answered them, and therefore will only briefly ask him to point out where phosphoric acid exists in the earth; particularly in the southern and south eastern parts of England. As to the other sources, I will mention the proportions of the principal of them, and then leave your readers to judge whether it is possible to obtain 38 per cent from them of phosphate of lime. Wheat can contain only a slight quantity, for there is from 94 to 97 of gluten and starch; milk contains about 0-30 in 1000 parts, so that an infant drinking 1000 pounds of milk takes in the 30th part of a pound, or about half an ounce and even that it never gives any off again; and egg shells contain one per cent., and that a combination of phosphate of lime and magnesia; if therefore, it is on such data as the above, that the "animalized carbon," is offered as a substitute for bone dust, I distinctly assert that it will disappoint the users of it; nevertheless it may be a very good manure in other respects. Should any further explanation, as to phosphate of lime, be deemed requisite, I shall be happy to afford it to your correspondent.

Yours, T. R. F.

London, 13*th May*, 1837.

THE IDENTITY OF THE FRENCH MANURE CALLED "ANIMALIZED CHARCOAL" WITH A PREPARATION OF HUMAN EXCREMENTS.

It was not a little singular, that while the article on the filth of towns, and means of converting it to manure, in the last No., was passing through the press, that we received from D. K. Minor, esq., editor of the New York Farmer, a letter of inquiry on the same general subject, and stating his design of saving, and converting to manure, the immense amount of fœcal matters which are produced, and serve merely as an enormous nuisance, in the city of New York. Mr. Minor, in conjunction with a French gentleman who is acquainted with Payen's method of preserving and utilizing these substances, is preparing for the execution of his plan; and every friend to the agricultural and general interests of the country must heartily wish success to his public-spirited and most important undertaking.

In answer to Mr. Minor's inquiries, we forthwith sent the sheets of the publication then in progress, expressing our views on the subject—large extracts of which he has republished in the New York Farmer, as well as other articles on the preparation of "*poudrette*" and "*urate*," which have been copied in the preceding pages. It is hoped that attention is now strongly attracted to this heretofore neglected subject, and, whatever may be the methods and means adopted for attaining the end that the main objects of benefiting health, and aiding fertilization, will be successfully and profitably reached.

In addition to all that we furnished on this subject, in the last No., and communicated to Mr. Minor, and to the information which he has derived from other sources, we have republished on the last page, some articles from the last London Farmers' Magazine, (of June, 1837,) which speak of the qualities and value of Lance's "animalized charcoal;" and it appears from another much longer article, (of no worth in other respects,) from the same eulogist of the manure, that the compound is similar to the "animalized charcoal," manufactured at Copenhagen, and in France—and that

human excrements form the basis, and principal fertilizing material, of all. An account of the effects and value of this new manure, "animalized charcoal," from an English periodical, was given to the readers of the Farmers' Register, at page 120, vol. iii.; and a much more full and explanatory account, at pages 568 to 570, vol. iii., which was translated for this journal from a new French publication. It is, doubtless, this same "animalized carbon," which is described as Payen's and Buran's manure, in the piece republished at page 128 of our last number. Some mystery, and perhaps some quackery, on the part of the manufacturers of the manure, was evident in the earlier accounts; as the discoverers wished at first to pass off their "animalized carbon" as the refuse or offal product of the sugar refineries—a far more costly article, and which was known to be a very rich manure—just as it now seems that Mr. Lance wishes to have his manure rated as pounded bones. But however the manufacturers and salesmen might desire to conceal the nature of the materials they used, and to have them believed to be such as are more costly, and less nauseous and offensive—it is very different with the public; and the discovery of the material used for the preparation of the "animalized charcoal," is precisely that which gives the great and almost the only practical value to that manure. The genuine article, composed principally of blood and sugar, rich as it might be, was too scarce and too costly to be of much benefit to agriculture; but the counterfeit article, which merely from its comparative cheapness was suspected to be "adulterated," promises to be highly valuable and important, because the materials are abundant, and their removal or consumption, in any way, will be beneficial. Yet *cheap* as is this manure considered in England, (about 1*s*. 6*d*. sterling the bushel, and 35 shillings the ton at Copenhagen,) compared to the bones and the refuse of sugar refineries, with which it is compared, that price, or the half of it, would make an enormous profit for the manufacturers of the compound manure, if prepared as Mr. Minor proposes —and so would the fourth of that price, if mild calcareous earth was the disinfecting and preserving ingredient used, according to the plan proposed in our last number.

If, then, we are right in supposing that the pretended "animalized charcoal" described in the two articles above referred to, is indeed simply human fœcal matters prepared for manure, it gives to those articles a new interest and value—and we recommend a recurrence to them to Mr. Minor, and to all who are sensible of the importance of the object of his enterprise. As the first article above referred to is short, it will be republished here: and for the much longer piece translated from the French, readers are referred to our former publication, commencing at page 568, vol. iii. of Farmers' Register.

'Animalized Carbon, a new Manure.

'This substance is of French origin, and its manufacture is secured by patent. It was discovered by a French chemist; but that it is a substance easily manufactured may be inferred from the fact of its being shipped free on board for 35s. per ton. Mr. Joseph Owen, of Copenhagen, acquired the knowledge of the manufacture from the patentee in France, and has since established a manufactory on his own account in Copenhagen. His traveller, a Danish gentleman, was the first to introduce this new manure to the notice of the Scottish agriculturists. We have not had an opportunity of seeing a sample of it, but it seems it has been tried last year by Mr. Dalgairns of Ingliston, and Mr. Inches of Cardean, who, we hope, will favor us with their opinion of its efficacy. We understand that the Danish gentleman has disposed of 250 tons of it in the counties of Forfar and Kincardine. Mr. Owen's card gives the following account of its nature, and the mode of using it:

"The chief excellency of this manure is, that it is powerful in its effects, occupies but little room, is easily separated, and conveniently used either by hand or drill; its effects are farther to ensure a rich crop, by gradually ameliorating the soil, and rendering fallowing unnecessary. For wheat, rye, buckwheat, barley, and similar descriptions of corn, about 8 cwt. 1 qr. 16 lbs. is used per acre: it may be either broadcast or drilled in before harrowing. For flax, hemp, beet, potatoes, &c. about 10½ cwt. per acre; and 12 cwt. 2 qrs. 10 lbs. per acre for artificial meadows, different sorts of cabbage, rape, culinary plants, and for refreshing natural meadow land. For plants that are set in rows, a handful is put to each plant; for those which are transplanted, a child follows the planter and throws a very small handful of the manure into each hole, which is immediately covered over with earth; in several places for rape, it is scattered out in rows along the roots of the plant, which the plough covers by forming a new furrow. On meadow land it must be spread out in December or January, when the snow is not on the ground. Generally speaking, it is well to mix the manure with half its quantity of finely sifted earth; but there is no necessity for pursuing this method. On light and warm soils about 2 qrs. 22 lbs. less per acre is used than on cold or clay lands, where an extra 2 qrs. 22 lbs. are added to the quantity as beforehand directed to be used; it is in fact left to the farmer's judgment to make use of the above directions, according to local circumstances. What characterizes this manure most is, that it developes its effects so slowly and gradually, that it may be applied without danger in contact with the seed or roots of plants; in this it differs from a number of other manures which are less rich, but more heating. In Scotland it has been tried in 1834 on eight different soils, has been found nearly epual to bone dust for turnips, and has since been ordered in large quantities from the manufacturer, Mr. Owen, at Copenhagen, who delivers it free on board at 36s. per ton."—*Ed. Quar. Jour. Agr.*

PROSPECTS OF CROPS IN SOUTH CAROLINA—THE CURRENCY.

To the Editor of the Farmers' Register.

Abbeville District, S. C.,
July 12th, 1837.

* * * * * *

In the present disastrous and deplorable condition of the country, when the tempest of ruin is sweeping over the land with ruthless force, carrying in its train the destruction of all kinds of business, and prostrating public, as well as private credit, it is pleasing to hear that the labors of agriculture are likely to be compensated with an abundant reward.

It may be some gratification to you, to know what are our prospects here. You are apprised that, in South Carolina, not much *small* grain (a term used, I suppose, in contradistinction to the *larger* grain of Indian corn) is cultivated, except oats. This latter grain has yielded a good harvest. The wheat crop is much better than it has

been for many years, both in quantity and quality. Our Indian corn looks very promising, and must be abundant, unless cut short by a drought. Cotton had an untoward spring to contend with, which caused it to come up badly in some instances, and retarded its growth; but, the late warm weather has produced a favorable change for the better. This plant thrives best under an ardent sun, and when the nights are warm. The present low price of the article, has, in a small degree, diminished the quantity planted, which consequently is so much gained to the corn crop, a circumstance much to be desired. The high prices heretofore obtained, stimulated planters to augment the production, and the increased production has measurably overtaken, and perhaps exceeded the consumption. This result would necessarily have reduced the price, but the reduction would have been more gradual, and the fall less rapid, had not other causes operated, which accelerated the declension. The people of South Carolina, had not embarked in those enormous and ill-judged speculations which threaten to overwhelm some of the other states. We will be able to weather the storm without being materially injured. Legislative interposition is not deemed necessary to shield the citizens from the impending ruin brought on others by wild and unwise schemes of making fortunes suddenly. Our merchants and planters have been in the main, prudent. These terrible revulsions read admonitory lessons which are too often forgotten in the seasons of prosperity. The tremendous effects of the present embarrassments may, perhaps be long remembered, and stand, like beacon lights, to warn future generations of the folly of governmental interference with the currency, and of the danger, and bad consequences of overtrading. But the subsiding of the mad rage for speculation, the restoration of a sound general currency, and good crops, with the practice of economy, will, it is to be hoped, cause the country to recover from its paralysis, and diffuse, once more, the smiles of plenty and prosperity over the face of our happy land.

REMARKS ON THE AGRICULTURAL SURVEY OF THE STATE OF MASSACHUSETTS.

The commonwealth of Massachusetts has earned a new and most honorable distinction, by having, first of all the confederated states, directed the making an agricultural survey of her territory. The execution of this important public work is entrusted to the Rev. Henry Colman, who is very advantageously known as a farmer, and writer on agriculture.

The people of New England are noted for understanding well their pecuniary interest, and pursuing whatever course tends to promote their profit; and we believe that they never had a better chance to get back fully, and with increase, their "money's worth," than upon the sum that will be expended in this earliest adventure of this kind, in our new country. If we did not know it to be as vain as "to call spirits from the vasty deep," we should earnestly recommend to the people and legislature of Virginia, to follow this example of our hard working, frugal, and thrifty sister commonwealth, Massachusetts.

As the first and an essential step towards restoring the health and vigor of a sick man, is for the physician to search out and to learn the nature, the extent, and malignity of his diseases, so is it a necessary preliminary to general or extensive improvement of agriculture throughout a country, to know well its existing condition—including all that is wrong, as well as all that is correct, commendable and profitable. When the British Board of Agriculture was established, the first and most valuable measure undertaken, was the execution of minute and accurate agricultural surveys of every county in Britain, the results of which were presented to the public in full reports. This part of the operations of the board, engaged the labors and the talents of perhaps fifty of the best informed scientific agriculturists and practical farmers of Britain; and their reports, though confined mostly to statements of then existing circumstances, contained a more valuable and instructive body of information than ever had before been presented to the farmers of that country, and the world. Before that time, many old and useful practices, of some districts, were scarcely known at the distance of fifty or an hundred miles. Among the earliest fruits of the surveys, and obtained almost immediately, were the first public information of Elkington's theory and mode of vertical draining, and the process of "*warping*," (or adding to the soil of tide lands by retaining and depositing the mud suspended by the water)—the first of which alone, to a country like Britain, was worth the cost of all the county surveys. Parliament even voted a reward of £1000 sterling to Elkington—a rare, if not a singular case of benefits to agriculture being thus acknowledged and rewarded, by any government.

The expense permitted to be incurred for the survey of the state of Massachusetts will probably not exceed what the British government paid for the single county of Yorkshire—and of course the performance of service, and the utility, must be slight and imperfect, compared to what might be available. Still, it must be very beneficial to the improvement of the agriculture of Massachusetts; and such a work would be productive of tenfold profit to Virginia, Maryland, or the Carolinas, (without looking further,) because their natural and as yet almost dormant resources for improvement are very far greater than those of Massachusetts.

But neither this measure, nor any other of the many by which agricultural instruction and improvement and profit might be advanced by government, are to be hoped for in Virginia. We *have hoped*, but now *despair* of any such movements and their results. Rather than pay $10,000 for the benefit and improvement of agricultural interests, the legislature of Virginia would expend $100,000, in the time and cost of speechifying against any measures proposed for that end. Very recently, an extra session was held, which cost nearly $30,000, (and which was not grudged, and has scarcely been complained of,) solely for the purpose of relieving the banks from the penalties which they had incurred, by violating their legal and most solemn and imperative obligation to pay specie for their bills—and to place these institutions, for all future time, beyond all control of any legal or moral obligations, by showing

them with what absolute impunity their most solemn and necessary restrictions might be disregarded and contemned. If the question had been to pay as much as this recent expense of extra and iniquitous and destructive legislation, for the most undoubted and solid benefits to agriculture, probably not more than twenty members of the body would have voted for the appropriation; and in such a case, we incline to believe that ten out of the twenty would have been turned out of their places, for that vote, at the next election, by their former friends and constituents belonging to the agricultural interest.

EXPERIMENTS TO TEST THE PROPRIETY OF GATHERING CORN-FODDER RECOMMENDED.

The fodder gathering season will commence before the issue of the next No., and we beg leave to remind all readers who are doubtful of the propriety, but still continue that practice, of the necessity and great importance of making judiciously planned and carefully conducted experiments, to settle the question.

If removing the green leaves and tops of corn, (as usual) for fodder, is as injurious as we believe it to be, the farmers of Virginia are thereby sustaining an annual loss, far exceeding in amount all the taxes paid by them to government. The experiments necessary to remove all doubt from this contested matter, are troublesome and difficult to make, in such manner as to be decisive, and entirely satisfactory; and though many have been commenced, few, if any, have been satisfactorily conducted and concluded. If the government, (directly or indirectly) had offered a reward of $500 for such experiments as would be entirely satisfactory, and their results should show the practice to be improper, and cause it to be abandoned, then that reward, (extravagant as it would be pronounced to be by all demagogue legislators, and grog-pen politicians and court-yard orators,) would be returned to the people, increased more than five hundred fold, and that to be repeated in every future year's crop to be made in Virginia.

EXPLANATION OF A MISTAKE.

The last of the two pieces in this number, headed "New method of propagating apple trees," inserted in page 213, was cut out of one of the many newspapers in which we had recently seen it, for the purpose of publishing it, with some comments on the falsehood and folly of the directions, and the very general circulation given by agricultural as well as other papers, to such marvellous and foolish statements. But before our intended remarks were written, some were published in the "Yankee Farmer" which were so good, and so well met our views, that they were inserted instead, at page 208. The article which was the subject of the piece of ridicule, and of our previously intended remarks, had been laid among the selections for republication; and not being thrown out, when no longer wanting, during our absence it was set up, and printed off. Trivial as the matter may be, it is deemed necessary thus to explain why this ridiculous blunder should have been made, of gravely publishing, without dissent or remark, a piece which had been treated, in a previous page, as it deserved, with ridicule and contempt.

From the Louisville Advertiser.

TO NATURALISTS.

On Wednesday evening, the 21st of June last, the uncommon heaviness of the clouds, the loud peals of thunder, and vivid glares of lightning, portended a storm and drenching rains; and, commencing about half past 7 o'clock, it rained incessantly for nearly an hour. On Thursday morning I was surprised to see the puddles of water collected in the streets, and the commons, swarming with a species of the piscatory tribe, which I have endeavored to describe, in what follows, from the observations made with the naked eye.

In size they vary from 10 grs. to 3 dwts., and though it is plain they belong to the order *Abdominales*, it is difficult to designate rightly the particular class; but I venture, however, to rank them with the genus *Exocetus*, of which they appear to me to be a species, although the pectoral fins are not united with the sides quite near enough to the spinal membranes to be the true *evolans*. The pectoral anal, ventral, and caudal fins, whose radinor bands are flexible and elastic, are broad, and elongated, not having yet completed their growth. The number of rays in the bronchial membrane are not discoverable. The pharyngeal bones being very small and imperfect, I could not ascertain whether the teeth are pointed or flattened; the eyes full and large; the head triangular when the maxilaries are closed and somewhat scaly on the exterior of the occipital bone; and the skin of the body scaly and viscid. By placing them in a glass jar of water between myself and the ray of a taper, I found the body to be transparent and void of veins or arteries, except in the laminæ attached to the hyoid bone, and near the connection of the operculum to the upper maxillary, and in the spine, which are the only parts of the body containing blood vessels visible to the naked eye. The membranous sac, containing air, called the *air-vessel*, which is placed under the spine, and by compressing or dilating which, they are supposed to rise or sink in the water, is very large, covering the whole interior of the sides and backs, otherwise in the internal appearances I could discover no remarkable variation from the general anatomical constitution of the *Exocetus evolans*. Whether they are *hermaphroditical oviparous* or *ovo-viviparous* fishes, I will not say; but leave it for those to determine who are older than myself in the abstruse but pleasing science of nature.

Whether they ascend in the ova or spawn in those mists or vapor that form the nebula, and lived and attained their present magnitude in the dense clouds that float through the elements, or whether they were drawn up as large as their present size, and descended again with the rain, is what I will not attempt to decide. I have frequently, after a heavy rain in a dry season, observed the ground covered with myriads of young frogs of the order BATRACHIA, genus *Rana*, but never once supposed that the same cause which *rained* the croakers from the etherial world might also *rain* fishes. A gentleman of my acquaintance observed to me not long ago, that a species of the *Cyprinus Carpio*, which are found

principally in the nothern lakes, and in the Ohio river near Cincinnati, and all who saw them declared they had never before known such fish to be taken from the western waters; as they are not migratory, it is probable they were transported in the clouds.

My object being to invite the attention of the eminent in the philosophy of nature to a subject which I believe has never yet come under the observation of such, I will not venture any opinions of my own; but respectfully submitting what I have already written to those who are less liable to err, conclude a communication much longer than I intended it.

D. L. Wood.

[The foregoing article presents a strange and as yet unaccountable fact, of which there have been too many similar stated on good authority, to be denied.—But none ot the causes stated above, or elsewhere, are sufficient; or even tenable, as actual occurrences.

But it is not for the curiosity of the facts stated that we have republished this piece, so much as for the curious manner in which they are presented. The piece is a perfect specimen of the *obfuscating style*—or that mode of writing by which darkness is spread instead of light. Many a plain man, of good sense though no scholar, and used merely to plain and common English, might read through more than half this description, before he could even guess what animals the writer was speaking of; and he might have been no wiser to the end, if the writer had not afterwards condescended to use the common terms "fishes" and "frogs."

But though the source of supply of the fish is hidden, it is not so with the young land frogs; nor are we left to suppose, from the want of any other origin, that they fell from the clouds, when they are seen in great numbers. Their march may generally be traced backwards to rivers, or other pieces of water, whence they issue, after ceasing to be tadpoles, in the night, and hop to considerable distances before morning. They hide during the heat of the day, and it is only after rains, when the earth is moist, and the sun obscured, that they all leave their hiding places, and are then seen in such numbers, as to induce many persons to believe that they fell from the clouds with the rain that had just ceased. But such an opinion would not have been supposed to gain credit with a man of science, or even with one who, like the writer, above uses so exclusively words "of learned length and thundering sound."—Ed. Far. Reg.

STATE OF CROPS.

The rains, since the middle of June have been very generally propitious in lower and middle Virginia—though many places still suffer much with drought—and the crop of corn in general promises an abundant harvest. Our tobacco and cotton crops also promise well. Reports are also favorable, as to all the staple crops in the south. The wheat has already proved to be a crop very far exceeding the hopes entertained by the most sanguine but a few weeks before the harvest. Still, we do not concur in the general belief, that, in Virginia, there has been a full or average crop of wheat reaped. But, in general, every man has strong grounds, and peculiar reasons which we heartily pray may never again exist, to rejoice in the present prospect of plentiful crops. For it is the tillage of the earth, principally, indeed almost exclusively, that is to pay off the enormous debts in which our people are involved; and under the deplorable existing circumstances of our trade and currency, it is not only a matter of joy for the farmers who are to profit by the sale of the abundant crops, and for the consumers who will get cheaper supplies of provisions, but also for every citizen and lover of his country to rejoice in the hope of this bounty of nature enabling us so soon to remove the evils brought upon ourselves by our own folly and madness.

From the Mining Journal.

EFFECTS OF SEA WATER ON IRON.

Iron, after remaining a long time submerged in the sea, is converted into plumbago. As an evidence of this change, M. Eudes Deslongchamps has lately presented to the Linnæan Society of Normandy some cannon balls taken from the bottom, off Cape le Hogue, which were sunk with the ships under Admiral Tourville, in 1692.—They do not at first sight appear to have undergone any change; but when examined, are found to have lost two-thirds of their weight, and may be scraped or cut with a knife, like black lead.—They contain no remains of their original ferruginous qualities, and have not the least effect upon the loadstone or magnetic needle.

From the Farmers' Magazine.

SPONTANEOUS COMBUSTION.

I think the cotton manufacturer should be apprised of the imminent danger and risk he incurs from the contact of cotton and linseed oil. To this cause alone, I am inclined to refer the origin of many of the destructive conflagrations which have occurred not only in cotton manufactories, but the warehouses of Liverpool. From facts I might refer to, conjoined with my own experiments, this conclusion may be clearly substantiated and confirmed. A small portion of linseed oil sprinkled in a bale of cotton will certainly occasion spontaneous combustion.

From the same.

LABURNUM SEED.

The fact of the highly poisonous nature of the seeds of the laburnum cannot be (especially about this season of the year,) too generally known, as children are apt to eat them from their pea-like forms and the appearance of the pods. Serious accidents have occurred from this circumstance, and, if I remember right, death has supervened in more cases than one. I know no better remedy than an emetic, followed by a solution of chloride in water, or chloride of soda or of lime, as strong as can be taken. This is the most effective remedy I have ever seen in cases when *corna, &c.* had followed the action of poisons in the case of accidents from vegetable poisons.

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

The present month has been more calm than several of those which preceded it; but it has been more like the calmness of death, than of serenity and content. Failures in this country have been less numerous, because few are left to fail of those who were extensively engaged in business during the present year. The ruin which spread over this country, has extended to England, where many houses connected with the American trade, have, after strenuous efforts, been compelled to yield.

Shipments of produce continue, but in few instances with a view to profit. They are made rather from necessity than choice—to pay debts, even at a sacrifice. Bills of exchange are scarcely obtainable, even at the enormous premium of 20 to 22 per cent.; and however good the parties by whom and on whom they are drawn may have stood some weeks or months past, a vast proportion are dishonored or unpaid. Cotton is shipped from the south and west at all prices from 6 to 12 cents—and the quantity exported is, 1,050,000 against 950,000 last season. 583,000 bales have been received at New Orleans against 486,000 at the same period, in 1836. The stock in Great Britain more than doubles that of 1836, and the demand for goods is diminished. There is, therefore, little prospect of any improvement in the price.

The quantity of tobacco brought in for inspection (in Virginia,) is 10 to 12,000 hhds. less than last year. In New Orleans, 25,600 hhds. have been received against 45,000 last year; but this difference will not long continue. The article commands a good price, considering all circumstances. The markets in Europe were never before so low. The range of prices, at our inspections, is from $2¼ to $7. A few vessels are loading for Europe, but very few, compared with ordinary years.

The first deliveries of new wheat were made at $1 75 per bushel—subsequently, at $1 62, and down to $1 50. But the millers show no disposition to extend their engagements at this price, which may be quoted as the current rate of the day. The quality of the crop proves very good, and foreign wheat will soon be neglected.

Domestic exchanges continue in the most deranged state, varying 10 or 12 per cent. between some places. Specie is driven from circulation, and the utmost inconvenience attends all minor transactions. With bountiful crops, and many other causes to render the country prosperous, the baleful influence of a deranged currency counteracts all the benefits which we might enjoy.

Importations from abroad are greatly diminished in consequence of the low state of American credit, and many articles have advanced in price. The reduction of our imports is, however, not to be regretted, as it prevents an increase of our foreign debt.

X.

July 26.

Table of Contents of Farmers' Register, No. 4, Vol. V.

ORIGINAL COMMUNICATIONS.

	Page.
On manuring,	204
On the general want of economy in our farming,	207
Statement of the products of suckers left to grow on corn,	208
A mare's twins of different races.—Marsh lands on the Chesapeake,	208
Items of economy,	210
Notice of the farming of J. F. Edmunds, in Charlotte,	211
On the benefit and profit of using oyster-shell lime,	218
On buckwheat as a green manure,	219
The true principles of agricultural and national prosperity concisely stated,	220
Remarks suggested by a visit to Warren county,	228
Kyan's process for preventing dry rot. On preserving the timber of railways, by the use of corrosive sublimate,	243
Marling. The four-shift system	247
On the use of real signatures to agricultural communications,	249
The identity of "animalized carbon," with a preparation of human excrements,	251
Prospects of crops in S. Carolina. The currency,	252
Remarks on the Agricultural Survey of Massachusetts,	253
Experiments to test the propriety of gathering corn-fodder recommended,	254
Explanation of a mistake,	254
State of crops,	255
Monthly commercial report,	256

SELECTIONS.

	Page.
Miscellaneous manures—clay—sand—pond, river and sea mud,	193
Remarks on manures in general—putrescent, mineral, and miscellaneous,	195
On the past and present state of horses,	199
New method of propagating apple trees,	208
Deepest mine in Great Britain,	209
Extraordinary speed of a steam carriage,	210
Method of destroying wolves and crows,	213
New method of propagating apple trees,	213
On artificial grasses,	214
Sure and cheap way to destroy rats,	219
Avery's "Rotary Steam Engine,"	222
Poudrette—French mode of preparing it—its value in France, &c.	223
Urate, or manure from urine,	224
Extract from an agricultural tour, in western N. Y.	224
Cellars,	226
Habits of the salmon,	226
The wire worm,	226
Utility of lime in preserving fence posts,	227
Mullein, a safeguard against mice,	231
Import of foreign wheat into the city of New York,	232
Another electro-magnetic machine,	232
On smut, canker, and rust or mildew in corn, with the causes and remedies,	233
Sugar from Indian corn,	245
Italian mode of excluding flies from houses,	246
Mode of protecting seeds from birds,	246
Introduction of American pea bugs into Europe,	246
Lance's "animalized carbon,"	250
On bone manure,	250
To naturalists,	254
Effects of sea water on iron,	255
Spontaneous combustion,	255
Laburnum seed,	255